Dun's Review, International Edition

A Journal for the Promotion of International Trade

Published Monthly by R. G. DUN & CO., The Mercantile Agency

Established 1841 — 290 BROADWAY, N.Y., U.S.A. — First European Branch Opened 1857

Subscription $3.00 U. S. Gold per year, payable in advance

Entered at the New York Post Office as second class matter.

Vol. XXIII. **MARCH, 1914** **No. 1.**

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DUN'S INTERNATIONAL REVIEW is also published monthly in Spanish, the Spanish edition being REVISTA INTERNACIONAL DE DUN. The Buyer's Guide on pages 3, 4, 6, 8, 10, 12, 13 and 14 is also printed in French, German, Italian, Russian and Dutch, to be mailed with copies of this edition to countries in which those languages are spoken. A Portuguese Supplement containing this guide is mailed with all copies of the Spanish edition sent to Brazil, Portugal and the Portuguese Colonies.

Correspondence regarding any topic of international trade interest is invited from readers of the Review and contributions on such subjects, if available for publication, will be paid for at space rates. Photographs of commercial scenes will be purchased, if suitable for reproduction. Manuscripts and photographs not used will be returned promptly if postage is sent for that purpose.

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A BRIEF COMMERCIAL GEOGRAPHY OF NICARAGUA

A Land of Great Natural Resources Requiring only Capital and a Stable Government to Achieve Enduring Prosperity

By Edward Neville Vose, Editor of "Dun's International Review"—Illustrated Principally by Photographs Taken by W. V. Alford, one of the Engineers of the Nicaraguan Canal Commission

WITH the exception of Panama, during the last two decades, there is no portion of Central America that has been the subject of such frequent and such intense concern in the United States as Nicaragua. Almost from the birth of the republic its internal affairs have been the subject of constant correspondence on the part of the American Department of State, while for nearly half a century the Governments of the United States and of Great Britain were in negotiation—happily at all times friendly—regarding the integrity of its boundaries. During the period of the gold rush to California, Nicaragua for a time rivalled Panama as the best available route for treasure seekers; it then became for a brief period the scene of the most famous exploits of the filibusters; and finally, for nearly half a century, was under almost constant consideration as a route for the great interoceanic canal that in the course of events—through no fault of its people or statesmen—has now been definitely located at Panama. Again with the exception of Panama, there is no part of Central America that has been more often described by American and European observers, more frequently visited by "Commissions," more exhaustively studied by scientists and engineers. At the present moment the country is entering upon what may prove to be a new phase of its history, and is once more attracting the attention of the statesmen and business men of both the United States and Europe.

SITUATION AND BOUNDARIES.—Nicaragua is the largest of the Central American republics, having an estimated area of 49,200 square miles, or almost exactly the same as the State of New York (49,170), about twice the size of Greece, and nearly half that of Italy. It is situated between 10° 45′ and 15° 10′ North latitude, and 83° 11′ and 87° 38′ West longitude from Greenwich. Its northern boundary extends from the Gulf of Fonseca northeasterly to the River Segovia and down that stream to Cape Gracias á Dios. Its only neighbor on this side is the Republic of Honduras, although the northern shores of the Gulf of Fonseca belong to Salvador. As the eastern shores of the gulf belong to Honduras, three republics share this splendid body of water. On the East, Nicaragua is bounded by the Caribbean, its coastline extending almost due South from Cape Gracias á Dios to the mouth of the River San Juan. The boundary with Costa Rica, on the South, follows the River San Juan inland to the Castillo Viejo, about 60 miles from the sea, and then runs parallel to the river, two miles to the South of it, and two miles South of Lake Nicaragua, as far as the River Sapoa, whence the line runs straight southwest to the center of the Bay of Salinas. The Pacific Ocean forms the western boundary, the trend of the coast being from the southeast to the northwest. The Honduran boundary is approximately 290 miles long, the Costa Rican 120 miles, while the Caribbean and Pacific coasts are 250 and 185 miles long respectively.

Courtesy Pan-American Union.

Nicaragua's "White House," the official residence of the President of the Republic at Managua

A glimpse of Lake Nicaragua from the village of San Carlos, showing the beginning of the San Juan River and the mouth of the Rio Frio, which flows into the lake from the mountains of Costa Rica

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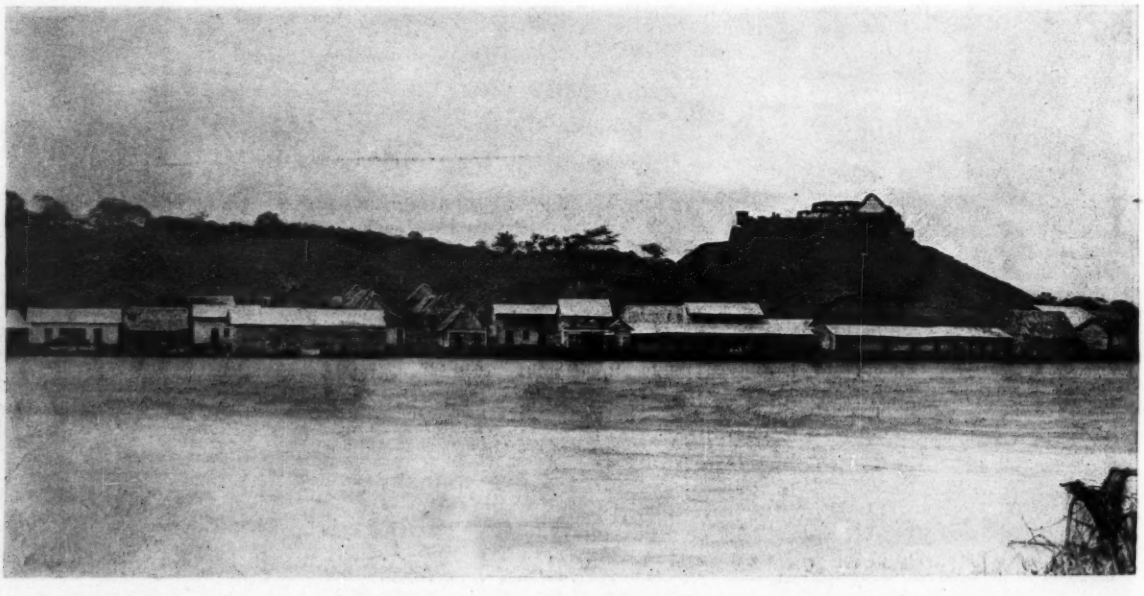
PHYSICAL CHARACTERISTICS.—The dominant feature of the physical geography of Nicaragua is the great depression which here extends entirely across the continent, the altitude of the divide at its lowest point being less than at either Tehuantepec or Panama. The greater part of the northern and central portion of the republic is hilly, the principal ranges being known as the Chontales, Matagalpa and Segovia mountains. These are continuations eastward of the Chile and Deplito ranges of Honduras and attain an extreme altitude of about 7,000 feet in the western portion, sinking gradually in a series of terraces to the eastward, but extending clear to the sea at Monkey Point. Southward and westward the hills decline to between 650 and 700 feet in height along the northern side of Lake Nicaragua. Close to the Pacific Ocean a volcanic range extends from one end of the country to the other and parallel to the coast. The first of the volcanic peaks on the north is Cosiguina, at the southern side of the mouth of the Gulf of Fonseca and directly opposite the volcano of Conchagua in Salvador. This is at present 2,777 feet high, but was formerly much higher, its entire top having been blown off in a terrific explosion, which took place in 1835 and was heard in Bolivia more than a thousand miles away. According to Reclus, the ashes, which turned day into night throughout Central America, fell over an area estimated at 1,600,000 square miles. Other important volcanic peaks are Viejo, 5,839 feet high; Telica, Momotombo and Momotombito, Mombacho, Ometepe and Madera—the last two being volcanic cones situated in Lake Nicaragua itself. It is along this volcanic ridge that most of the principal cities of Nicaragua are located.

The old fortress, "Castillo Viejo," from the rear or landward side—a viewpoint seldom seen by tourists

Low alluvial plains extend for a considerable distance inland along the Caribbean coast. Coral polyps form low-lying reefs along these shores, rendering navigation more difficult. The eastern slope is drained by several large rivers. The first of these to the northward is the River Segovia, Coco or Wanks, as it is variously called (the Pan-American Union mentions 14 other names by which it is known). It is 300 miles long and navigable for 240 miles, the last 110 miles for light draft vessels only. Other large navigable rivers are the Rio Grande (or Matagalpa), 230 miles long, navigable but for a bar at its mouth; the Bluefields and the San Juan. The Bluefields is navigable for about 60 miles inland by large ocean steamers as far as the city of Rama, and the lagoon at its mouth forms a fine natural harbor. The San Juan drains the northern slope of Costa Rica and the great Nicaraguan depression in which are located the great lakes Nicaragua and Managua. The former, which is 110 miles long by about 40 broad, has an area of 2,600 square miles and is the largest lake between Lake Michigan and Lake Titicaca in Bolivia. Lake Managua, which is 24 feet higher, is about 30 miles long and 16 wide. The Tipitapa River, which joins the two lakes, is not navigable—frequently drying up entirely during the dry season—while the San Juan has five rapids near the Castillo, situated about 40 miles from the lake, but is navigated by small river steamers which maintain a tri-weekly service. This region has been the subject of innumerable reports and many surveys with a view to cutting a trans-oceanic canal at this point instead of at Panama. There is now little likelihood of the canal ever being built, nor do present traffic conditions warrant the construction of locks around the rapids with a view to making the river navigable to the lake for large steamers. As the depression in which the two lakes are situated extends almost to the Pacific coast there are no streams of importance on the Pacific side.

CLIMATE.—The climate of Nicaragua is modified by the proximity of the two oceans as well as by the mountain ranges. On the Atlantic slopes and in the *tierra caliente* of the coastal lowlands summer begins in January and ends in May, but rainfall here continues to be more or less heavy during every month of the year. The prevailing winds are from the northeast, the "trades," and come laden with moisture from the Atlantic. Another comparatively dry season in this region is in August, and again in October, these periods of relatively less rainfall being called *veranillos*. On the Pacific side and in the lake region the rainy season, or winter, is between the middle of May and the middle of November, with a *veranillo* in August. The amount of rainfall varies widely, being reported as high as 297 inches at San Juan del Norte, 97 inches at Rivas, (a town between Lake Nicaragua and the Pacific) and 96 inches at Metagalpa, in the mountain region, 3,300 feet above the sea. At San Juan del Norte the mean average temperature for a year was 77° Fahr., and the same was reported for Rivas, on the Pacific side. In the highlands it is much cooler, but most of the population of Nicaragua lives in the *tierra caliente*, which is here less dangerous to health than in many countries owing to the porous tufa which makes up the soil formation. The *tierra templada* is encountered on the slopes of the volcanoes and over much of the sparsely settled terrace region in the center

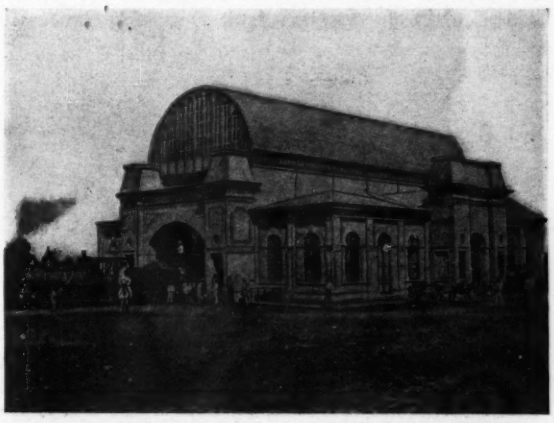


The famous "Castillo Viejo" looking across the San Juan River. This fort commands the river at a point about 40 miles from the sea, where several rapids render navigation difficult, except at high water

of the country, while the *tierra fría* includes the volcanic peaks and the extreme heights of the interior highlands, the latter being covered largely with pine and oak forests. Severe volcanic disturbances have been frequently recorded in the history of Nicaragua since its first discovery, and earthquake shocks have not been rare. As a rule, however, these disasters have not been attended with any great loss of life—even the tremendous explosion of Cosiguïna, already referred to, being preceded by preliminary warnings that enabled those living near it to escape.

History.—The first white man to visit the region now known as Nicaragua was Columbus, on his fourth and last voyage. Reaching the mainland of Central America at Cape Honduras, his little fleet of four ships encountered tempestuous seas until, on the 12th of September, 1502, he doubled the cape to which he gave the name of Gracias á Dios for the calmer waters and fairer skies he there encountered. This name still remains, and the cape marks the northeastern limit of the present Republic of Nicaragua. From this point the great navigator skirted the coast as far as Panama, losing a boat at the mouth of a river which he named El Rio del Desastre in consequence. This was probably the Rio Grande in Nicaragua, the bar at the mouth of which is still very dangerous. It was not until 1519, however, that the exploration of the country was systematically begun. The first pioneer was Gil González de Avila, or Dávila, who made a marvellous journey overland from the Pacific side in 1519-1523, starting inland at a point near David, in the present Province of Chiriqui in Panama, and finally reaching the shores of Lake Nicaragua, where he found a chief of that name, after whom the Spaniards eventually named the country. The wealth brought back by González aroused the cupidity of Pedrarias, the Governor of Panama, who at once set about conquering the country. Owing to the fact that the native population—which, according to early Spanish historians, was very great—lived largely on the plains around the volcanic cones to the west of the great lakes, the work of conquest proved much easier than in Guatemala and Costa Rica, where the mountains were higher and less accessible. As a result of the cruelty and greed of Pedrarias and his successors, the population was nearly decimated, many of the natives being shipped to Panama to be sold as slaves. In 1570 Nicaragua became a part of the Captain-Generalcy of Guatemala.

The annals of the two and a half centuries of colonial administration reveal no evidences of any systematic attempt to develop the resources of the country, although mining and agriculture were carried on successfully, and commerce with the adjacent provinces and the mother country flourished. An English traveler who visited the country in 1665 called it "Mahomet's Paradise," from its exceeding goodness, and reported that the cities of Granada and León were very wealthy, the former being one of the richest in all North America. He reported that in a single day while he was there six *requas*, or caravans, arrived from San Salvador and Honduras, each comprising at least 300 mules, laden with indigo, cochineal and hides; while two days later three more came in from Guatemala, one laden with sugar, another with silver, and the third with indigo. This commercial activity was due to the fear of pirates, which caused the Colonial Government to send all merchandise from every part of Central America to Granada, thence across the lake and down the River San Juan to Cartagena. This traffic naturally brought great prosperity in its train and caused the people of Nicaragua to produce flour, achiote, cochineal, wine, precious woods, resins, fibres and other products for exportation. It was the golden period of the country's prosperity and continued until 1778 when Charles III established free trade between the colonies, which scattered the traffic formerly going by this route and took away the incentive for this diversified local production. In 1686 Granada was attacked by a party of French and English buccaneers and sacked, and in 1780 the fortress Viejo Castillo on the River San Juan was captured by an English expedition from Jamaica, which was sent to conquer the whole country, but proved too small to accomplish so great a task. Captain Nelson, afterwards one of England's most famous admirals, was a member of this expedition. With these two exceptions, and a few minor raids by buccaneers and pirates, the country enjoyed uninterrupted peace throughout the long period of Spanish control.



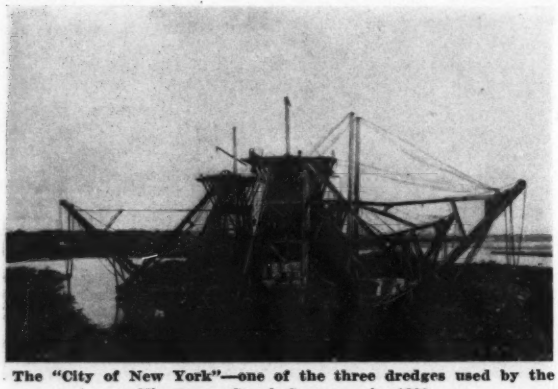
Courtesy Pan-American Union.

Station of the National Railway at Granada, terminus of the line from Corinto, and head of navigation on the lake

The history of the first few years of the Republic of Nicaragua is a record of successive revolutions and almost incessant civil war. In spite of these disturbances a group of American capitalists succeeded in organizing a "Compañía de Transito de Nicaragua." This was subsequently merged into "The American Atlantic and Pacific Ship Canal Company," which was granted a concession carrying a monopoly of steam navigation on the republic's inland waters. This important privilege was secured by Mr. E. G. Squier, the most distinguished of all the diplomatic representatives ever sent by the United States to Central America, and the author of several works upon that region that are still highly valuable. At the same time Mr. Squier negotiated a treaty by which the

A street on the outskirts of Rivas, a fine old city situated on the Transit Road, which crosses the Isthmus between Lake Nicaragua and the Pacific, terminating at the little port of San Juan del Sur

United States agreed to recognize and defend Nicaragua's sovereignty along the entire line of the projected canal. The Transit Company, as it is usually called in the annals of the period, quickly established steamship sailings from San Francisco to San Juan del Sur, on the Pacific side of the narrow isthmus between the ocean and Lake Nicaragua, and between San Juan del Norte, at the mouth of the San Juan River on the Caribbean side, and New York. A steamboat was placed on the lake, and two small river steamers put on the River San Juan, while stage coaches were



The "City of New York"—one of the three dredges used by the Nicaragua Canal Company in 1889

provided to carry passengers from San Juan del Sur to Virgin Bay on the lake, over a macadamized road that is known as "the Transit Road" to this day. For a time this Nicaraguan route carried many thousands of passengers to and from California and proved very profitable to its owners. Its prosperity was destroyed when the Panama Railroad was completed in 1855, and the route was eventually abandoned.

While the civil conflict between the Serviles and Liberals of Nicaragua was at its height a Californian adventurer named Byron Cole proposed to the leaders of the latter party to bring in a corps of American riflemen, to be known as "La Falange Americana," or American Phalanx. The proposition was eagerly accepted and in May, 1855, Cole's chief, William Walker, landed at Realejo, a short distance from San Juan del Sur, with a party of 56 Americans from San Francisco. Thus began what proved to be the greatest and most famous exploit of the filibusters—groups of rash adventurers from the United States and Europe who during this period sought to emulate Cortez and Pizarro and conquer for themselves empires in the New World. Walker, who was undoubtedly the ablest of the lot, after several unsuccessful engagements, boldly attacked Granada, the Servile capital, and, taking the garrison by surprise, captured it. This *coup* established the Liberals in power, with General Walker as the head of the army. Recruits flocked to his standard from California and the Southern States until he had a force of 1,200 Americans and other foreigners. War was declared against Nicaragua by Costa Rica, whose citizens feared that the filibusters would soon seek to conquer all of Central America, but Walker proved a capable commander and easily crushed all op-

A transit party surveying for the canal in 1900—the tree shown is 175 feet around the roots

position. In 1856 he was elected President of the Republic by a vote of 15,835 out of a total of 23,236 votes cast. He had, however, antagonized the Transit Company by causing its charter to be annulled on account of deficiencies in its payments to the Government, and the company retaliated by taking off its boats, thus cutting off the arrival of more recruits and supplies. He also alienated many of his native supporters by repealing the constitutional provision prohibiting slavery in the Republic. Encouraged by these errors in statesmanship, his enemies rallied, and a furious civil war followed, during which Walker burned the rich city of Granada rather than surrender it, after a siege in which his forces were outnumbered ten to one. Finally, in 1857, Walker and the remaining remnant of his filibusters surrendered to the captain of a United States naval vessel lying at San Juan del Sur. He afterwards made two attempts to return to Central America, the first of which was frustrated by the United States and the second by Great Britain, and in 1860 he was turned over by the British captain, to whom he had surrendered, to the Honduran authorities, by whom he was summarily shot.

After the expulsion of Walker from Nicaragua in 1857, which was effected by the aid of troops from Costa Rica, a dispute with that country delayed peace for a time. These differences were settled in 1858 and a new constitution adopted in 1859. The President elected that year served two terms, during which—and for seven successive administrations of four years—the country remained at peace, save for a slight revolutionary outbreak in 1867, which was speedily suppressed. During this long period—from 1859 to 1893—the country prospered and population increased rapidly. At the Paris Exposition of 1889 Nicaragua made an excellent exhibit, and to every visitor to her pavilion was given a card bearing portraits of the seven men who had succeeded one another as president of the republic since 1859, accompanied by a statement that Nicaragua was the only country in America that had enjoyed uninterrupted peace during that period. Subsequent events have caused this record to be forgotten by many writers. In April, 1893, a revolution broke out which resulted in the overthrow of the Government. This was quickly followed by another which placed Gen. José Santos Zelaya in power, who was elected for a full term in 1897 and ruled without interruption thereafter—in spite of occasional efforts to overthrow him—until 1909. General Zelaya was succeeded by Madriz and the latter by Estrada, each of whom resigned before his term of office expired. The present President is Señor Adolfo Diaz, who is serving out the unexpired term of Estrada.

COMMUNICATIONS.—The only direct steamship sailings from the United States to Nicaragua on the Atlantic side

W. V. Alford's transit party surveying for the Nicaraguan Canal Commission in 1900

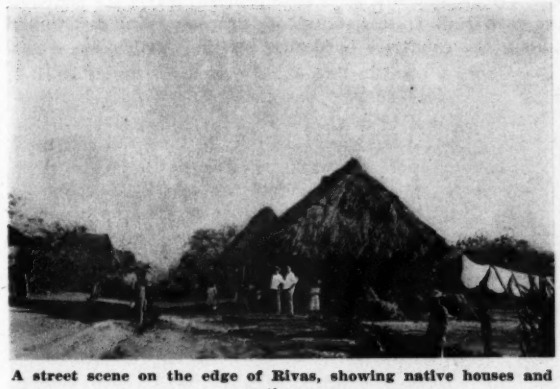
are from New Orleans, from which port the United Fruit Company has sailings every other Thursday for Bluefields, where freight for Greytown is trans-shipped to other steamers. The Bluefields Fruit & Steamship Company has weekly sailings, every Saturday, for Bluefields and semi-monthly sailings (Saturdays) for Cape Gracias á Dios. The Southern Pacific Company (Morgan Line) accepts freight from New York to Bluefields and Greytown via New Orleans, whence it is shipped by connecting steamer. All of these lines carry freight, passengers and mails.

For the Pacific Coast the Panama Railroad Steamship Line accepts freight for San Juan del Sur and Corinto, via Colón and Panama, and thence by Pacific Coast steamers. This line has sailings five or six times a month for Colón. The Hamburg-American Line, Atlas Service, has weekly sailings by the same route, the Royal Mail Steam Packet Company, semi-weekly sailings and the United Fruit Company sailings every Wednesday and Saturday. All of these boats carry freight, passengers and mails. The American-Hawaiian Steamship Company takes freight only, with sailings every five days for Coatzacoalcos, thence by rail to Salina Cruz, and southward by steamer to Corinto and San Juan del Sur.

From San Francisco, the Pacific Mail Steamship Company despatches vessels twice a month for all Pacific ports of Mexico and Central America, including the two belonging to Nicaragua, while the Kosmos Line has monthly sailings for Corinto. From Seattle the Kosmos Line has sailings once a month for Central American ports. From

Vancouver, B. C., the Canadian-Mexican Line has sailings once or twice a month for Salina Cruz, where connections can be made with any of the foregoing lines of coasting steamers. There is also a ten-day service between ports in Central America and Salina Cruz maintained by the Salvador Railway, which calls at both the Nicaraguan ports on the Pacific.

The present railway system of Nicaragua is confined chiefly to the Pacific coast and the lake region, and comprises altogether some 191 miles of track. Of these 171 are the property of the Government, while 20 are light lumber railways on the Atlantic coast near the Rio Grande. The Government system, which has usually been operated by a private company, starts at the Pacific port of Corinto and runs inland to León via Chinandega, and thence to Managua, the capital, and Granada. There are branch lines from Chinandega to El Viejo, from León to Momotombo, and from Masaya to "Los Pueblos"—a group of small towns in a rich coffee-growing district—this line terminating at Diriamba, 1,644 feet above sea level. In conjunction with the national railway lines, steamboats are operated on both the great lakes and on the San Juan River to Greytown, thus forming a transcontinental route that is occasionally followed by travelers, but is of little value for the shipment of merchandise. The rolling stock on the railway is of American manufacture, as are the steamers. There is great need of a railway line from



A street scene on the edge of Rivas, showing native houses and a native cart

Managua to Matagalpa, the most prosperous and progressive city in the interior, which would traverse a region rich in coffee plantations, cattle and mineral wealth. Some years ago a railway was projected to run from San Miguelito, on the eastern shore of Lake Nicaragua, to Monkey Point, on the Atlantic coast, but—apart from a little grading—nothing was done. A later project provides a transcontinental route comprising a railway line from San Ubaldo, on the northern shore of the lake, to Rama, the head of navigation on the Escondido or Bluefields River, and thence by river steamers to Bluefields. This, also, is a matter for future enterprise to develop. Stage lines run from the railroad to a few of the principal towns nearby, but roads are as a rule poor, and practically impassable in the rainy season for vehicle traffic. For most points removed from the railway lines or rivers the only means of communication are mule trails.

THE MINING INDUSTRY.—Although there are no very large individual mines, the gold mining industry as a whole is of considerable importance. In the period of Spanish control gold appears to have been found in abundance, and during the gold rush to California many miners, returning by the Nicaraguan route, turned aside to explore prospects they had heard of. Some of the veins then discovered are still being worked. In the northeast, near the source of the River Pispis, a branch of the Coco, Segovia or Wanks, is an important mining region with several stamp and roller mills in operation. This district is about 270 miles from Cape Gracias á Dios, freight being carried from 120 to 200 miles of the way by river boats (according to the season) and the rest by oxen. Exports of gold from this district to the United States average $250,000 per annum. Gold is known to be present in paying quantities throughout the vast mountainous region of the North and Northeast, but the great difficulty of prospecting in the dense tropical forests and lack of transportation facilities have retarded the exploitation of these deposits. Another important mining district on the Atlantic slope is located at

Looking down the San Juan River from the village below Castillo Viejo

the head waters of the Prinzapolca River, where placer mines are giving way to systematic vein mining with good results. Exports of gold to the United States from Bluefields, the port nearest to this region, average $500,000 annually.

The oldest mining region in the country is the Chontales district around La Libertad, on the western slope of the mountains just north of Lake Nicaragua. Here there are a score of mines in successful operation, the yield ranging from one-quarter to two ounces of gold per ton. In the Department of Nueva Segovia the yield is from one-half to three ounces per ton, and 50 or more mines are reported to be in operation. In the vicinity of Matagalpa the number of mines is even larger, while one of them, the Leonesca, employs several hundred men. The Santa Francisca mines, near León, are said to have produced more gold than any other in the country. Most of the mines in the western part of the republic belong to English companies, while those in the northeastern part are chiefly American. Altogether there are about 500 gold mining claims registered. Rich deposits of silver are known to exist, as vast quantities of this metal were found by the

A pineapple walk at Rivas. Many travelers praise the high quality of Nicaraguan fruits

Spanish during the sixteenth and seventeenth centuries, but lack of capital and adequate means of transportation have prevented the re-discovery and exploitations of these deposits. The Nicaraguan Government is liberal in its treatment of mining enterprises, making no distinction between foreigners and natives in the right to acquire and hold mining property. Mining machinery is admitted free of duty, and there are no taxes, national or municipal, levied on mines.

COFFEE.—The principal agricultural staple grown in Nicaragua, and the one upon which the prosperity of the country most largely depends, is coffee. The coffee tree grows well almost everywhere, according to Señor Don José D. Gamez in his *Noticias Geográficas de la República de Nicaragua*, who states that at an altitude of from 200 to 2,000 feet the annual rate of production is in the vicinity of one-half pound per tree, in some cases one pound; at from 2,000 to 3,000 feet the rate fluctuates from one to as high as five pounds per tree; and above 3,000 it diminishes gradually until it ceases entirely. Mr. Gustavo Niederlein reported the number and distribution of trees by Provinces in 1898 to be as follows:

Department—	No. of Trees.	Department—	No. of Trees.
Managua	9,761,500	Chontales	500,000
Carazo	6,000,000	Chinandega	500,000
Matagalpa	4,500,000	Rivas	150,000
Jinotega	1,580,000		
Granada	1,000,000	Total	27,072,500
Nueva Segovia	531,100		

While these figures are no doubt partially estimates they correspond very nearly with those reported four years previously by the Pan-American Union and by Señor Gomez in the work above cited. The Government encourages the cultivation of coffee by paying five cents a tree to planters having 5,000 trees or more in certain Departments (Matagalpa, Jinotega, Nueva Segovia and Chontales), but frequent political disturbances and the severe fall in prices in recent years have no doubt offset the effect of the bounty, so that it is doubtful if there are many more trees at present than there were fifteen years ago. Practically all of the coffee exported is shipped by the way of the Pacific ports. The crop varies in amount from 14,000,000 to 22,000,000 pounds annually. Exports in 1909 and 1910 in quantities and values, were as follows:

EXPORTS OF NICARAGUAN COFFEE, BY COUNTRIES, FOR 1909 AND 1910:

Country—	1909		1910	
	Kilos.	Value.	Kilos.	Value.
France	3,762,913	$748,309	4,072,022	$1,011,221.05
Germany	2,267,520	397,370	3,480,629	793,614.65
United Kingdom	1,392,861	246,157	1,859,427	419,044.30
Italy	193,758	35,226	908,191	200,748.40
United States	452,554	72,197	743,229	149,885.10
Spain	3,036	607	41,400	10,350.00
Honduras	141	28	11	2.75
Other European Countries	360,285	55,374	923,607	210,285.00
Other American Countries	8,255	1,651	....	.....
Total	8,441,323	$1,556,919	12,028,516	$2,795,151.25

BANANAS.—The cultivation of bananas for export is an industry which in Nicaragua is still in its infancy, but is now likely to increase rapidly in importance. At present it is confined to the region around Bluefields, where one American company has purchased 193,000 acres of banana lands which have not as yet been put under extensive cultivation. Two lines of steamers call at this port for the fruit, all of which is shipped to the United States. Exports since 1907 have been as follows: 1907, $83,251; 1908, $267,541; 1909, $420,607; 1910, $680,655. Official returns for 1911-1913 are not yet available. These figures indicate that large areas are rapidly coming under cultivation and that Nicaragua will soon secure more nearly its share of the vast traffic in this succulent fruit now being distributed among the countries bordering on the Caribbean.

A collection of native fruit gathered at the home of one of the Guatusa Indians

A cane field near León. The cane of Nicaragua is very rich in saccharine matter and exceedingly hardy—many fields bearing every year, of which no one in the neighborhood can remember the date of planting

SUGAR.—Sugar cane is cultivated in nearly every part of the republic, growing with great luxuriance, but most of the product is consumed within the country, so that the export returns give no idea of the importance of the industry. It is stated that the cane of Nicaragua is extremely hardy, and that it is not unusual to see fields of sugar cane in full production, of which no one in the neighborhood can remember the date of planting. A crop can be secured within twelve months after planting, and thereafter two, and in some localities three, crops a year can be harvested almost indefinitely. The canes are soft and contain as much saccharine matter as those raised in the West Indies. There are several large and well equipped plantations, with modern machinery capable of producing from 200 to 300 tons of excellent vacuum-pan sugar. The small

(*Continued on page 84.*)

Bow River, the source of the main water supply of the Canadian Pacific's $50,000,000 irrigation project in Alberta, showing portion of the Horseshoe Bend Dam, which is nearly 8,000 feet long

IRRIGATION DEVELOPMENTS IN WESTERN CANADA

A Single Project Costing $50,000,000 and Reclaiming for Cultivation 3,097,580 Acres

By A. S. Dawson and J. O. Doyle, Calgary, Can.—Illustrated from Photographs Loaned by Canadian Pacific Railway

SUPPLYING moisture to desert and semi-arid lands by artificial means is no new achievement in the enterprises of civilization, and has been practiced in one portion of the globe or another from time immemorial. It was practiced with success by the Arabians and Assyrians many centuries before the Christian Era, and history records that the flood waters of the Nile were utilized to irrigate its fertile valleys thousands of years ago. The ancient Romans operated vast systems, which are in use at the present time, and the Chinese are credited with having put water on their rice lands by artificial means several centuries before the history of Europe began.

It is now definitely known that this ancient art was first practiced in America, in pre-historic times, by the Pueblo and Aztec Indians, who inhabited what are now portions of Arizona, New Mexico and parts of South America.

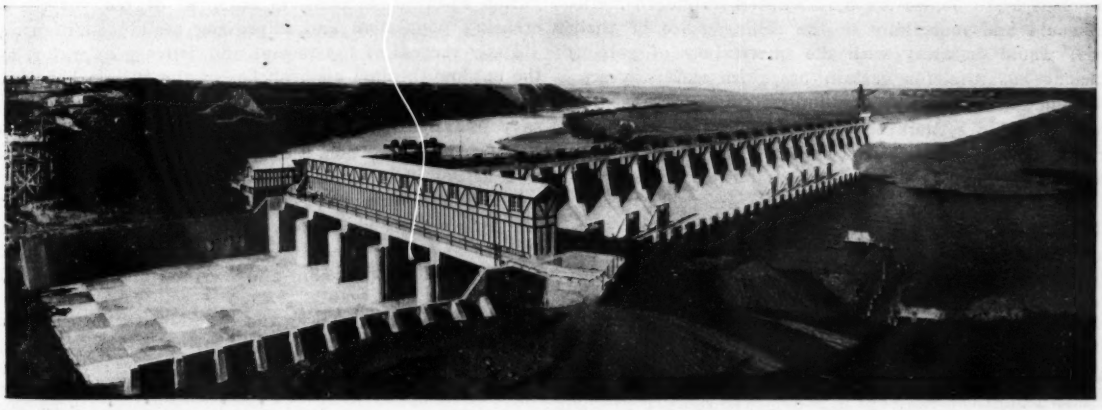
Mormons settling on the shores of the Great Salt Lake were the first English-speaking people to make a systematic application of the principles of irrigation in western America; this was shortly followed by the use of ditches in Californa, which were originally constructed for placer mining. The satisfactory results obtained therefrom soon induced settlers in the States of Idaho, Washington, Oregon, Wyoming and Arizona to resort to similar means in the cultivation of their crops. This was followed by large private enterprises acquiring vast tracts of lands in these and other States, and in 1902 the Reclamation Act was passed by the Government of the United States. This great enterprise, under the direction of the Secretary of the Interior, has now, either in operation or under construction, projects involving an expenditure of $90,000,000, and in 1912 had undertaken to complete 43 projects destined to serve upwards of 4,100,000 acres of lands.

The extent to which irrigation is practiced to-day is frequently overlooked. India leads with some 55,000,000 acres; United States, 22,000,000; Egypt, 8,000,000; Italy, 5,000,000; Spain, 3,000,000; while China, Japan, Canada, Australia, France and South America have considerable irrigated areas. The works providing for the irrigation of these vast tracts represent an outlay far in excess of one billion dollars, and according to statistics compiled the annual crops are in excess of that amount.

Irrigation in Western Canada may be said to date from 1892, when a series of dry years turned the attention of the settlers to the possibility of aiding the growth of their crops by the artificial application of water. The question subsequently assumed such importance as to warrant its being taken by the Federal Government at Ottawa, with the result that well-considered and comprehensive laws were enacted. A system of general surveys was undertaken to determine the source and value of available water supplies, and the location of areas where such water could be used to the best advantage.

These surveys showed that three extensive tracts in Alberta offered special advantages for irrigation. One of these, containing 250,000 acres, was situated in the Lethbridge district, which could be supplied from the St. Mary River. The second area contained about 350,000 acres, lying near the junction of the Bow and Belly Rivers. It is interesting to note that the works necessary to serve these two tracts have either been built or are now under construction. The third, a much larger area, situated along the main line of the Canadian Pacific Railway, and extending about 150 miles east of Calgary, was undertaken in 1903, and it is this construction which is chiefly reviewed in this article. The work to irrigate this immense tract of land, owned by the Canadian Pacific Railway, and comprising 3,097,580 acres, although commenced in 1903, will not be completed until the end of the year 1915. Water was first utilized in 1907, and by 1915 the entire district

Nearer view of the Bow River spillway and embankment at Horseshoe Bend, looking downstream. The embankment is 310 feet wide at its base, and at the left is shown the huge intake of the main canal which starts here

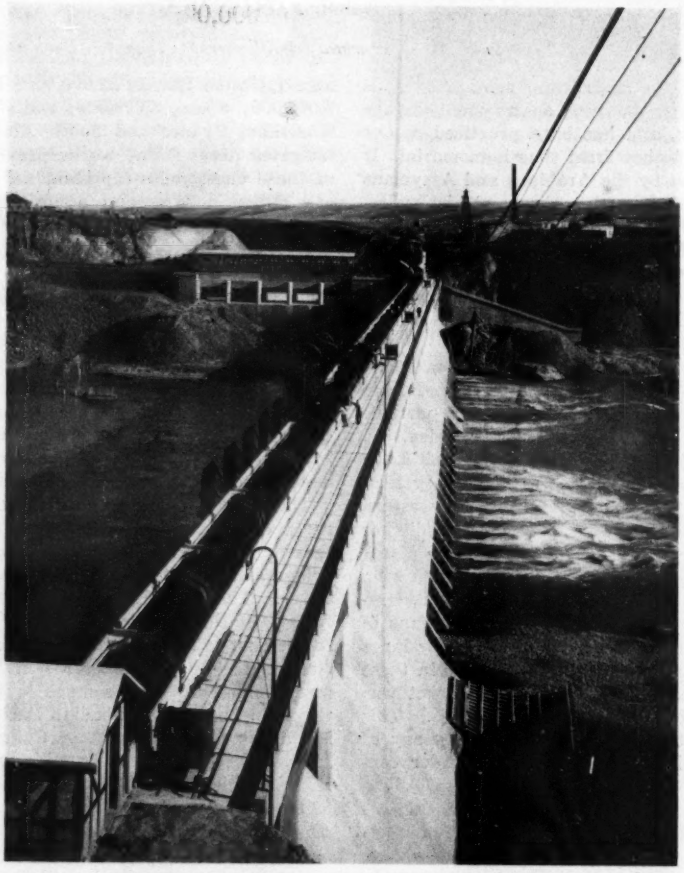


will be under water. This contract is reported to be the largest in America, if not in the entire world, undertaken by a single corporation, and to date approximately $50,000,000 has been expended.

The "Block," or section to be irrigated, is an open, prairie plateau, with a general elevation of about 3,350 feet above sea level at its westerly limits, sloping gradually until a general elevation of about 2,300 feet is reached at its eastern boundary. Its main water supply is the Bow River, which originates in the Rocky Mountains. The Bow River usually reaches its highest stages between June 15 and August 15 of each year; its lowest stages are during January and February. Its maximum flood discharge at Calgary is probably close to 100,000 second feet, although hydrographic records for both extreme high and low water are rather meagre.

The precipitation varies considerably from year to year, and decreases easterly as the altitude becomes lower. Meteorological records exist only subsequent to 1886. The average annual precipitation at Calgary between 1886 and 1910 was 15.5 inches; the minimum for the same period being 5.90 inches in 1889, and the maximum for that period was 31.90 inches in 1902.

The soil is good, consisting of a heavy, black loam and clay subsoil in the westerly portions, with a lighter sandy loam of great depth, overlying clay and hardpan, at its easterly limits. The land, generally speaking, is particularly well adapted to irrigation, and while excellent crops have been cultivated annually on non-irrigated areas in this Block for the past twenty years, it is now a recognized fact that without irrigation certain crops cannot be raised to advantage. It was conceded by the executives of the Canadian Pacific Railway, some years ago, that development and colonization by advanced irrigation methods would add materially to the selling price of their lands; would do away with the uncertainty of getting sufficient moisture for certain crops in certain years; would admit of intensive farming on smaller areas, and would result in settlers being attracted in greater numbers than could otherwise be expected; all of which are the basis of the revenue-producing value of any agricultural country, as far as traffic receipts are concerned.



Portion of the spillways, showing the 24 electrically operated flood gates. The spillway is 720 feet long and 40 feet high

The plan has been adopted for constructing the complete distribution system, so as to deliver water at the boundary of each farm unit of 10 acres or less, it being considered impracticable to leave to the settlers and farmers the building of the smaller ditches, which would have resulted in delays to the work, excessive cost, and a retarding of the development of the area, followed by increased difficulties in operation. In constructing the distribution system, 160 acres have been considered the farm unit, although in the western section of the Block several colonies have been established consisting of the so-called "Ready-Made" farms of 80 acres. In the eastern section of the Block about 5 per cent. of the farm units will be sold as 80-acre farms, in addition to the establishment of a number of colonies on farms averaging from 80 to 120 acres each. These "Ready-Made" farms, which are fenced, improved, cultivated, stocked, and provided with seed grain by the Canadian Pacific Railway, have proven quite a success and are attractive to skilled European farmers. The farms are sold to certain farmers at a low figure, payable in twenty years, and in addition to the foregoing improvements a substantial cash loan is made by the company for the purpose of assisting the farmers for the first couple of years. This system of colonizing lands is a new departure in the annals of colonization, and is probably without a parallel in the history of civilization.

The successful outcome of any large irrigation project is only partially solved by good construction; and in some cases the administrative heads of large schemes have failed to realize that the ultimate success of such enterprises cannot be fully brought about without the farmer, and that it is the latter's labors which determine the real value of such properties. With this fact in view, the officials of the Canadian Pacific Railway entrusted the sale of lands in this Block to a large organization, with extensive connections over Canada, United States, Great Britain and Continental Europe, and which has succeeded in the last six years in disposing of nearly 2,000,000 acres. The immigration returns compiled by the Department of Interior at Ottawa, show an ever increasing flow of settlers and farmers, year by year, into Western Canada, and the irrigation successes account, in no small degree, for the increasing population and improving social conditions.

Daily records of the receipt and delivery of water, and the outflow through all branches of the system have been maintained from the beginning, such data being as necessary in irrigation management as is bookkeeping in any commercial institution. The information thus obtained is essential in enforcing proper water economy; in preventing land from being injured; and in keeping farmers from getting in careless habits in using water, which, if once acquired, result in reducing crop production, increased cost of operation, and needless annoyance to the management.

Worldwide experience in the use of water on cultivated lands under any kind of crop during a long period of years shows that the duty varies with (1) the nature of the soil, (2) the age of the soil, (3) the kind of crop,

(4) the weather conditions, (5) the slope and condition of the conveying channels of supply, (6) the distance the water is carried in ditches and channels to the fields and, (7) the experience and skill employed in irrigation. The *legal* duty in Western Canada is fixed by the Irrigation Act, as continuous flow of one cubic foot per second per 150 acres for 153 days between May 1st and September 30th. The measurement of this supply is arranged for by weirs, approved of by the Commissioner of Irrigation.

Near the center of the irrigation area a reservoir has been constructed, known as Lake Newell, which is nine miles long and four and one-half miles wide, its storage capacity being some 186,000 acre feet. It is filled each season after the close of the irrigation period, and is the means of materially reducing the cost per acre of the project, as a whole.

Three miles from Bassano, at Horseshoe Bend, are a concrete spillway and concrete faced embankment, the latter having a length of 7,000 feet and a width at its highest point of 310 feet at the base. The spillway, which, for dimensions and general utility, is unique in irrigation annals, is 720 feet in length between abutments, with a maximum height of 40 feet. The dam as a whole contains 400,000 cubic yards of concrete and 2,500,000 pounds of re-inforcing steel. The incidental and accessory structures, consisting of headgates, spillways, drops, flumes, bridges, dams, etc., are numbered in the thousands, while in their construction millions of feet of timber, board measure, millions of pounds of re-inforcing steel, and hundreds of thousands of cubic yards of concrete were used.

Close view of the spillway at Horseshoe Bend. The entire dam contains 400,000 cubic yards of concrete and 2,500,000 pounds of reinforcing steel, making it one of the most notable concrete structures in the world.

Everything that follows in the wake of increased population is an argument in favor of irrigation and the cultivation of small areas, which can only be carried out successfully by this means of farming under the existing conditions. No practical agriculturist can fail to realize the fact that the scope for irrigation in semi-arid lands is very great. The possibilities in the agricultural region of Canada are only just beginning to be realized and this system of intensive farming that is now being worked out in Western Canada will ultimately become a vitally important factor in the agricultural development of the Dominion as a whole.

INTERNATIONAL URBAN EXPOSITION AT LYONS

To Comprise Exhibits Relating to Every Phase of the Organization of a Modern City

ECONOMISTS, public administrators, manufacturers and others interested in the most effective methods of promoting civic welfare, are expected to attend in large numbers the International Urban Exhibition, which will be held at Lyons, France, from May 1 to November 1 of this year, under the auspices of the French Government.

The exhibition, in conjunction with which a French Colonies' Exposition will probably be held, is to be divided into 52 sections, devoted to all subjects relating to the organization of a modern city. The information and apparatus collated for each will be unusually comprehensive, beginning, under the head of Statistics and Demography, with a study of the causes bringing about changes in population—births and deaths—emigration from rural districts to cities, and including such topics as Protection of Children and Care of Infants, Dwelling Houses, The School, Instruction in Arts and Crafts, Protection and Hygiene of Labor, Heating and Ventilation, Lighting, Foods and Drinks, Physical Culture and Sports, Prisons, Hospitals and Charitable Institutions, Social Economy, Streets and Highways, Transportation, Sciences, Arts, Books and Newspapers, Electricity, Post Offices, Telephones and Telegraphs, and a number of industries.

Each of these sections is divided into one or more classes, and each class into two groups: one, scientific, economic and social; the other, industrial and commercial. Aside from the exhibits in the various sections, historical exhibitions will be organized and several scientific congresses will meet during the progress of the exhibition.

Manufacturers, scientists, artists and other exhibitors from all parts of the world have been invited to participate, and will be grouped in pavilions specially reserved for them, and will compete for awards with French manufacturers in the same class. No charges have been made for entrance fees or for ground rent to exhibitions of an economic, social or strictly scientific nature, but such exhibitions will not be included in the distribution of awards.

THE PLANTAIN AND BANANA AS ARTICLES OF COMMERCE

Distributed in the Tropical Zone Entirely Around the World these Plants Furnish Food to Millions of its Inhabitants

By J. B. Percival, Paramaribo, Dutch Guiana

AMONG the varied and profuse vegetation with which tropical countries abound, the plantain usually attracts particular notice. Its broad leaves gracefully overhang the succulent stem, while huge clusters of yellow, red and other colored fruit contrast harmoniously with the shining, dark-green foliage. The height that this splendid plant usually attains is eight feet, but occasionally specimens reach an elevation of 12, and even 15 feet, with a diameter of stalk of from one foot to two feet.

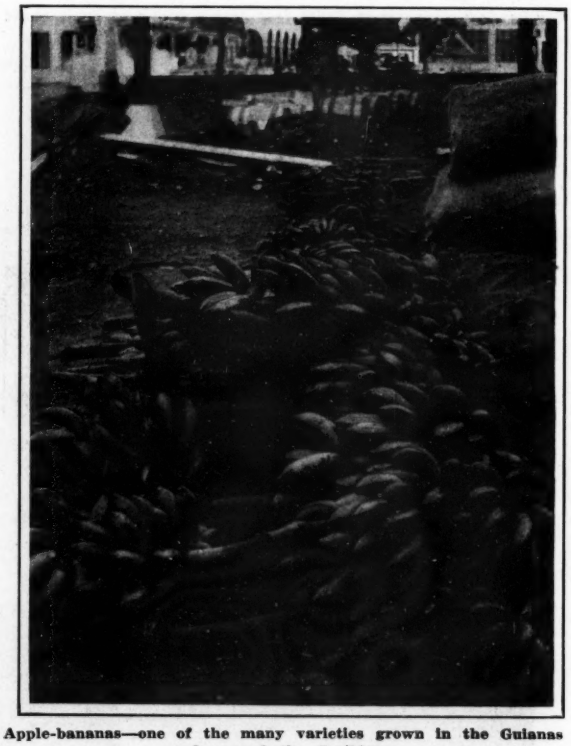
The plants of the *Musa* tribe, though they cannot, like the palms, be called the princes of the vegetable kingdom, rank first among endogenous plants, and attract attention, not only for the breadth and beauty of their foliage, but for the abundance and quality of their fruit. They are devoid of true stems, but form a spurious stem—often of considerable thickness—from the leaves as they rise from the root stocks encircling each other and completely enveloping the slender flower and fruit stalk. The banana is like the plantain, but its stalk is marked with purple spots and its fruit is shorter and rounder. The names plantain and banana are very indiscriminately applied in many countries where they are grown, but generally the term plantain is restricted to the larger plants, the fruits of which are usually eaten cooked, while banana is applied to the smaller varieties, which when ripe, being more saccharine, can be eaten raw as fruit. The French call plantains "bananes," and bananas "cacoves," or fig bananas.

These plants are not entirely confined to the tropics. The plantain may be seen, laden with its enormous masses of wholesome fruit, in the mild climate of Madeira, but its yield is dependent on, and varies with, the temperature of the climate in which it is grown. Within the tropics it grows literally everywhere, and might be cultivated to any extent. Hitherto its value has been practically unknown to the people of the United States. Its fruit is

Plantains exposed for sale in a market in Dutch Guiana, for native consumption

consumed as a substitute for bread in the Guianas, but, for all other purposes, it has been valueless. The plantain is, to many thousands of people in these countries, what rice is to the Hindoo, rye flour to the Muscovite, and wheaten bread to the people of the United States. It is their main dependence in more senses than one—their staff of life.

The plantain is one of the most striking examples of tropical fertility and exuberance. A plant, which, in a northern climate, would require many years to gain strength and size, matures in the tropics in ten or twelve months. The native of the South plants a shoot or sucker, taken from an old tree, in a moist and sandy soil along some river or lake. This develops with the greatest rapidity, and at the end of ten months the first crop may be gathered, though the clusters and bananas are yet small; but the following year one cluster alone will weigh some sixty or more pounds. Even in the tropics these are always cut off when green, as they lose much of their flavor when left to ripen or soften on the tree.



Apple-bananas—one of the many varieties grown in the Guianas and around the Caribbean

It is remarkable that the plantain and banana should be indigenous, or at all events cultivated for ages, both in the Old and the New World. Numerous South American travelers describe some one of these plants as being apparently indigenous articles of food among the natives, thus showing—if the plantain be a hybrid—a communication between the tropics of America, Asia and Africa long before the time of Columbus. The older writers on the colony of Guiana, as Hartswick, Bellin and others, consider the plantain to be a native. It is worthy of remark that Sir Robert Schomburgh during his travels found a species of large edible plantain far in the hinterland. The plantain is said to have been transported from Guiana to the Canary Islands and thence to the West Indies. It seems to have migrated with mankind from Asia into the numerous islands in the South Pacific Ocean, where it is universal in those that are inhabited, and has degenerated into numerous varieties. It has spread from the islands of the Pacific and of the Indian Archipelago, northward to China and Japan, and along the Malayan Peninsula to Chittagong, in Bengal. It grows freely in the jungles at the base of the Himalayas, as far as 30° N., for the *Musa nepalensis* is found in the Nepal. There are 20 varieties in Tenasserim, 10 in Ceylon and 30 in Burma. The most northern regions where the plantain is cultivated are

Japan, Madeira, the north of Africa, Syria as far as 34°, and parts of the south of Europe.

In short, the plantain is cultivated over an immense zone, which extends, although not continuously, from 38° North to almost 35° South latitude. A mean temperature of from 18° to 20° Cent. suits it best, provided, however, that the winters are not too rigorous. In Cuba the small species are cultivated in situations where the thermometer falls to 7° Cent., and even sometimes almost to zero. The *Musa sapientum* is satisfied with 18° of mean heat, but *Musa paradisiaca* requires at least 20° to 22°, and that, too, only in the climates of equatorial regions. It produces the best crops in a temperature of 24° to 28°, and yields no fruit at 20°, nor in an altitude of more than 3,000 feet in the latitudes between the equator and 10°.

The edible plantain bears at an elevation of 4,590 feet in a temperature of 61° Fahr., and requires 15 months to

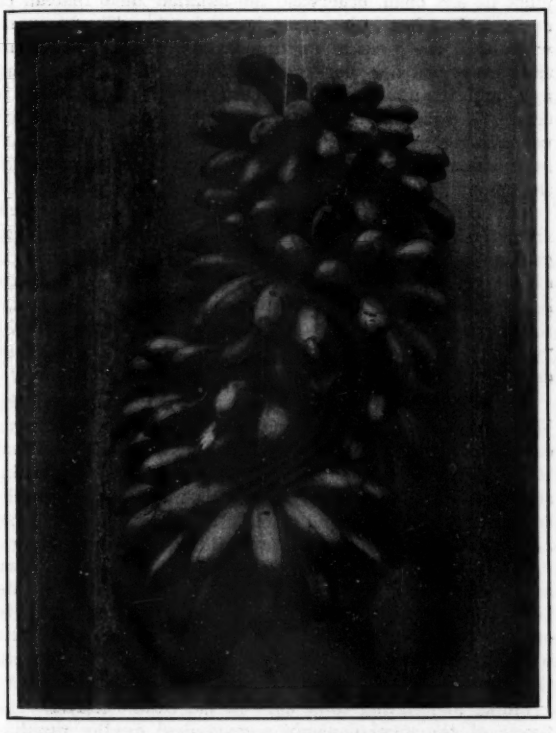


Fig-bananas from Dutch Guiana—one of the sweetest and most highly esteemed varieties

mature, but its cultivation is of little benefit at so high an altitude. It is the same with the cassava root. Sugar cane at 3,480 feet altitude gives no sugar, and indigo at 4,860 feet affords no coloring matter.

In the South American colonies the fruit of the plantain is dried and preserved, while the flour is separated and made into biscuits. The flour can be kept for 20 or 30 years, owing to the sugar in it. The fresh fruit contains 27 per cent. of dry nutritive matter, while the potato gives only 25. In the plantain, out of 100 parts, there are:

Water	14 parts	Sugar	2 parts
Starch	67½ "	Oil	½ "
Gum	3½ "	Albumen	4½ "
Cellular fibre	4½ "	Ash	3½ "

One tree gives 4 pounds of fibre, so that 600 pounds weight of fibre might be produced annually from each acre of plantains, while the top of the stem yields a juice good for making ink. The fibre furnishes material suitable for paper and canvas, so the plantain gives food both for body and mind. The Chinese use the young shoots for paper-making. Plantains covering 1,607 square feet of ground yield 4,000 pounds of nutritive substance which will support 50 persons; the same space planted with wheat would support only two. The Dacca plantain is nine inches long; in Madagascar the plantains are as large as a man's fore-arm. All the large ones require, like potatoes, to be roasted or boiled. The Poyat, or Martinique banana, also grows to a very large size in some districts, and yields more fibre than the common plantain.

A warm and rather moist soil is best suited to the propagation of the banana; that is to say, a soil in which there is a plentiful admixture of clay, as in the valleys and plains of Dutch Guiana. It seems to like the neighborhood of the sea and an atmosphere impregnated with salt, for it is in that kind of situation that it appears to prosper best. In the majority of countries where the plantain is grown no manure is necessary, owing to the decomposition of the stems and the alluvial nature of the soil. But in other less favorable soils manure may be required to maintain a vigorous and constant production. A plantain walk is usually established a little before the rainy season commences. The soil is loosened to a depth of about a foot, so as to receive the young plants. It is then thoroughly weeded, and any stones that may be there are removed. The suckers or shoots, taken from the parent stem, are from two to three feet high, their bulbs being divided from the principal bulb by means of a mattock. These slips are cut about eight inches above the neck and placed in a slanting position in the prepared holes and covered with earth, leaving only about two inches in sight.

The length of time which elapses between the planting of the slips and their fruiting depends on climate, situation and species. Thus, *Musa sapientum* fruits in the fifth and sixth month, while the *Musa paradisiaca* requires ten months, and sometimes even a longer period. Two varieties of the fig banana, the *canaya* and *gengi* produce their fruit in five months. In mountain districts, the fruit of the large banana ripens only at the end of eighteen or twenty months of cultivation; some varieties, indeed, in such position take three years to produce fruit. The leaves of the banana afford a useful shelter, and it is therefore of great service in tropical agriculture to young plants, which would otherwise suffer severely from the excessive heat of the sun. In British and Dutch Guiana the plantains are set six yards apart, and yams, maize, cacao or canes planted in the intervals.

The cultivation of the plantain is one of the easiest to undertake, and at the same time one of the most profitable. When once it has been planted, there is nothing more to

Bananas of the variety known as "Gros Michel," said to be immune from many destructive pests

do except to gather the harvest, for the trifle of manure bestowed upon the soil two or three times a year is nothing in comparison with the labor necessary to bring crops to perfection in the temperate zone. All these plants renew themselves with offshoots at different stages of development. It follows that each plantain offers at the same time rows whose branches are laden with ripe fruit, rows whose branches are full of blossoms, and young offshoots which give promise of future plenty. There is no culture that can be undertaken with more confidence than that of the banana, for even if climatic influences should

sometimes have a prejudicial effect on the crop, they can never completely destroy the prospect of a harvest, as there would always remain that to be obtained from the surviving and stronger growing offshoots or suckers. No other vegetable production presents similar advantages—not even maize, that crop so precious in many regions of the globe.

The large banana is gathered at three different stages. At a fourth part of its maturity it is rather milky and contains much starch. If it is roasted in ashes, or boiled in water, it forms a very nourishing food, capable of being substituted for bread. If cut at three-fourths of its growth it is less nourishing, but contains more sugar; in this state, it is eaten as an accompaniment to meat. Lastly, when the fruit is perfectly ripe, all the starch is changed into gum or sugar; it then develops an acid principle; in this state it is eaten either raw or in the form of fritters. The banana fig, which is eaten when perfectly ripe, is rather a fruit than a nutritive substance, it is soft, full of sugar, melting, possesses a powerful perfume and forms a principal dish for dessert in tropical regions. In some countries it is cut while green, and the natives hang the bunches in their houses to ripen. To hasten ripening in China the bunches are covered with rice, or even with lime. The Chinese also eat the flowers of the banana pickled with vinegar.

The banana when plucked keeps fresh for a week, at the end of that time it becomes yellowish and more sugary;

Bananas of the Congo variety gathered for export along a river bank in Dutch Guiana

in twelve or fifteen days it begins to decompose and ferment. In America there are two methods of preserving the banana; the first, used when the fruit is green, produces banana farina; the other, when the fruit is completely ripe produces the *platano pasado* of the Mexicans, or the *platano curado* of Colombia. In some parts of South America they grate the fruits, having first peeled them, squeeze the moisture out in a press, bake them, like manioc, in an oven, and by this means obtain a coarse kind of flour. But the nutritive property of this is inferior to that prepared from the dried slices, for no doubt the pressure which extracts the moisture expels also the soluble albumen and other nutritious elements.

Another method of preserving the bananas very closely resembles that commonly used in the preparation of dried fruits, such as figs, prunes, etc. The time chosen is when the fruit is quite ripe and its skin has become yellow, shaded with black. In Mexico, in the "tierra caliente," and particularly in Michoacan and Jalisco, bananas are dried simply by exposure to the atmosphere. The fruits are exposed to the sun in bundles, and when they begin to wrinkle they are peeled, for the skin, if left on, causes a disagreeable flavor. They are kept for some time, until an efflorescence of sugar appears on their surface as on dried figs and prunes. They are then pressed in masses of about 25 pounds each, and wrapped in leaves of the banana plant, or kept in boxes. Of course, these methods can only be adopted in countries where the climate is very dry. In others, recourse must be had to artificial means, which are unfortunately more costly.

There are three distinct ways in which the ripe bananas may be dried. First, exposing the fruit to an atmosphere of sulphuric acid gas before the desiccation is begun. Second, boiling rapidly very ripe fruit in water which contains sulphate of lime. Third, by boiling it in syrup. These methods cause the albumen and caseine of the fruit to coagulate, and the tendency of the banana to decay and ferment is stopped at a period favorable for desiccation. Experience shows that the second method is best. In most climates, without this precaution, the fruit instead of drying becomes damp. To expose the fruit to the sun's rays after boiling, trays of bamboo, or anything which permits the free action of the air and light on the fruit may be used. If rain falls, they are dried in a furnace which must be left open, otherwise the bananas bake instead of drying. The heat, also, must be moderate. The bananas, when dry, are pressed and packed in boxes. The fruit thus preserved is a very good article of food, resembling figs, and its abundance and easy preparation render it cheap. A company is now established in Dutch Guiana for preparing the fruit for export, and it is anticipated that in the near future American capital will be invested in the colony for the same purpose.

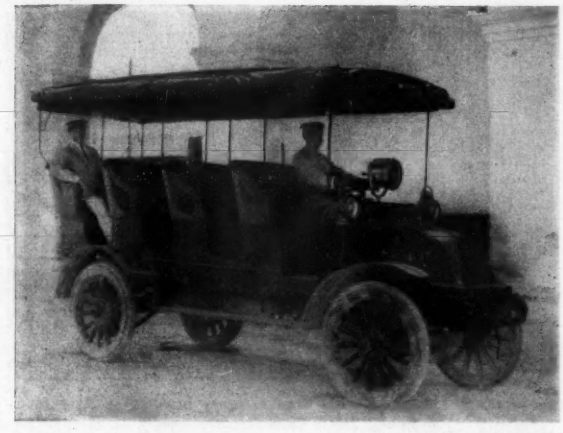
The Indians in Guiana manufacture a kind of spirit from the banana. When the fruit is fully ripe, the Indian gathers it, peels off the skin and throws the fruit into a dish, where it remains for some days. After fermenting, he draws off the liquor and puts it in his home-made bottle for future use. The liquor, or as the Indian terms it, "rum," is said to be strong and very intoxicating. When drunk to excess the effects remain for two or three days.

The flour of the plantain, known in many parts of the West Indies and Guiana as *conquintary*, is highly esteemed and extensively used as a food for invalids and children. It is prepared by stripping off the husk of the plantain, slicing the core and drying it in the sun. When thoroughly dry it is powdered and sifted. It has a fragrant odor, acquired in drying. As food for children and convalescents it would, probably, be much esteemed in the United States, and it deserves a trial on account of its fragrance and its being exceedingly easy of digestion. It is very nutritive on account of the protein compounds it contains. This plantain meal would probably be best and freshest were the sliced and dried banana cores exported, leaving the grinding and sifting to be done in the United States. The flavor of the meal depends a good deal on the rapidity with which the slices are dried, hence the operation requires dry weather, unless recourse may be had to a kiln or stove.

Vinegar from the plantain is obtained by a very simple process. When there is a glut of the fruit in the market the surplus, when yellow, is thrown into baskets supported on open barrels; there it liquefies and the juice drops into a receiver where it ferments and speedily becomes vinegar. No water is used in the process. The stalk is filled with an abundant pith, enveloped in fibrous cases, and containing much starch. Boiled, it might serve as human food, while animials like it very much, cattle, and especially pigs, relishing this kind of sustenance.

The banana plant is used in Annam, Cochin China and the Philippines in the process of refining sugar. Masses of raw sugar are placed in layers, one inch thick and ten wide, which are covered by a layer of stalks of this plant, cut into small pieces. According to Grosie, however, it is the ashes of the *Musa paradisiaca* which they use in this process. The aqueous liquor that flows from the stalks filtrates through the sugar, carrying away with it all impurities, and leaving the sugar in a crystalized state.

The sap is also of great value as a mordant in dyeing; the Malays, by means of it, fix the green color of the *Dolichos Lablab*. When employed alone the sap of the cochon banana communicates to fabrics a purple tint, which is durable. The sap has also medicinal properties.



An Adams twelve-passenger bus in actual service at Camajuani, Cuba. Body mounted on 1-ton chassis

An Avery tractor sold to a hardware company in the Philippines and used for a variety of purposes

THE WORLD-WIDE ADOPTION OF THE MOTOR TRUCK

Both Governments and Business Concerns in Every Part of the Globe have begun to Recognize the Many Advantages of Motor Vehicles

THE motor truck is past the experimental stage. Regarded as a curiosity no less than a decade ago, it is now counted by business men as one of their best investments. Every merchant who is still the owner of a horse-drawn delivery system is rapidly coming to the point of asking himself, not whether the idea of motor delivery is economically sound, but which build of truck is best suited to his needs.

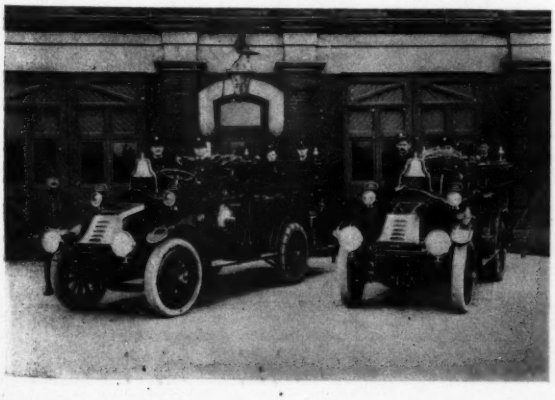
Another factor that is increasing the demand for motor trucks is the constant extension of its use to all lines of industry. The early hope that the truck might be sufficiently practical for replacing the horses of small merchants has been far exceeded. The modern truck is not only widely used by manufacturers, mines, lumber companies and a thousand industrial and mercantile lines, but is even threatening to compete with the railroads. A motor truck club in a large western American city recently raised a fund of $350,000 to promote the adoption of trucks in lieu of railroad cars for transporting goods between that city and its port, some 20 miles away. Incidently it was proposed to build a vitrified motor truck highway from the city to the points where commodities were to be unloaded directly to or from the steamers.

In the neighborhood of New York motor trucks are competing with the railroads in hauling over distances within a radius of 100 miles. Inter-city hauling between such large centers as New York and Philadelphia is daily increasing, the great advantage of the motor truck system being that the goods carried do not require crating and that they are handled by the companies' own employés. The articles are packed but once and then unpacked at their destination, as against six handlings when shipped by rail or boat. In spite of rough roads over which the machines sometimes travel, the goods are said to reach their destination in better condition.

Omnibuses and stages, when drawn by horses, seldom proved advantageous save between large traffic centers. Smaller towns were rarely included in the routes. The railroads and trolley lines have left hundreds of points untouched which horse-drawn stage coaches failed to serve successfully. Now, however, the motor bus is rapidly solving the distance problem of the small town. Powerful and speedy, it needs only a fair roadbed; can surmount difficult grades and, not only are many railroad and traction companies awakening to the advantages of the motor bus as a "feeder" for their lines, but private motor bus companies have established well-defined routes of their own that are playing a role of the utmost importance in rural development.

Aside from its use by manufacturers and merchants and by public service corporations, such as freight and passenger-carrying concerns, the value of the motor truck is proved by its adoption by municipal and national governments—a tendency which has been particularly notable during the year just ended. Motor-driven ambulances, fire engines, patrol wagons, hose carts and like apparatus

Two combination hose trucks and chemical fire engines on 1-ton Kelly chassis, for Springfield, O., Fire Department



Three-ton Gramm truck owned by the Department of Militia and Defense, Ottawa, Ont., Canada

There are many uses for motor trucks. This shows a 3-ton Kelly moving a house at Dallas, Texas

One of the five Adams trucks used to carry nitro-glycerine at Wilmington, Del. Capacity, 900 quarts

were perhaps the first forms purchased by large cities, and at the present time towns of 10,000 inhabitants and less are fast following suit. Public markets have adopted the truck for the distribution of provisions; departments of highways are using it for rapid spraying of roads and for otherwise keeping streets in condition.

The new parcel post system in the United States was a large factor in extending the use of motor trucks in that country's postal service. As soon as the post office department officials realized that the parcel post would become a reality on the opening of the year 1913, a number of motor truck companies were asked to submit bids, and, although the fact was probably not recognized generally, the machines that were accepted for use in the service figured as one of the most helpful agents in taking care of the flood of new mail matter—the handling of which had been previously declared too vast an undertaking for the Federal Government.

Into other departments of the Federal Government the motor truck has also made its way. At about the beginning of the current year, horses and wagons employed by the Congress of the United States for carrying books, documents and similar material, were replaced by a business-like motor truck system, and, while the United States army has not been equipped in all its departments with motor-driven vehicles, the horse is having a hard time to hold its own in the service.

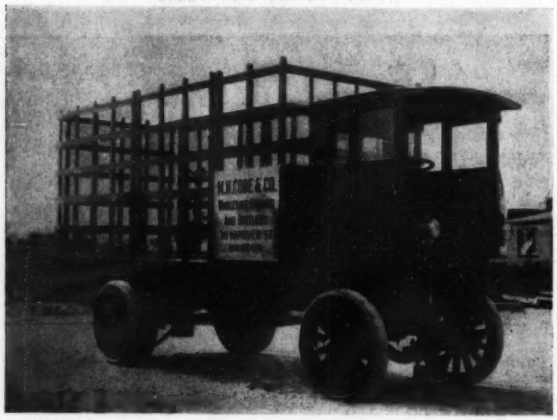
In European armies, also, the horse is playing a much smaller role than formerly. Recent maneuvers in the French army demonstrated the fact that one four-wheel motor tractor could draw big six-inch artillery guns over poor roads with greater ease than could two dozen horses. The motor vehicles in use were not confined, however, to the transportation of heavy artillery. They superseded the horse in the wireless telegraph department, the apparatus being installed on the truck bodies. They carried fresh meat and provisions to the army lines. They accompanied aeroplanes and transported them along the highways. Army repair departments were built into motor vans that were rapidly moved to wherever repair work had to be done. Finally, motor buses were used as officers' headquarters, and the ambulance service was equipped with motor cars exclusively.

Countries other than those mentioned are also rapidly adopting the motor truck, both officially and otherwise. In Dublin, Ireland, a number of merchants and business men who had been studying the subject of motor transportation for some time were recently forced during a strike of the carters to find some means of securing immediate delivery, and decided almost at once in favor of the motor truck. The success of the plan was so marked that several orders for from five to eight vehicles were received by manufacturers at one time.

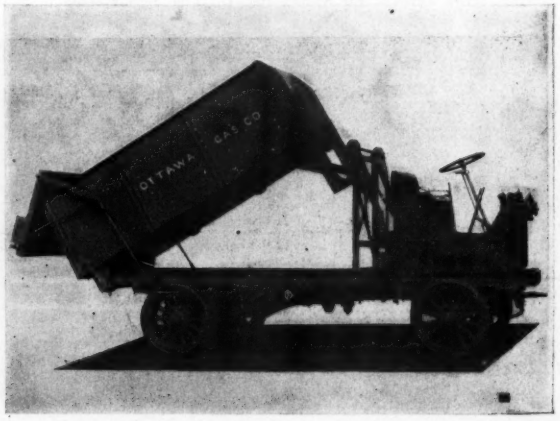
In Costa Rica there is said to be a growing demand for interurban bus lines. Within the past year some 18 motor cabs were reported to have been installed in San José with satisfactory results. In his estimates of expenditures for the Straits Settlements during the current year, the Register of Imports and Exports at Singapore reports that provision has been made for a motor truck and four dumping bodies. The demand for all types of motor vehicles in that region is declared to be growing rapidly.

At Tokio, Japan, the War Office has decided to purchase a number of military motor vehicles. Not only will a motor wagon corps be formed for transporting officers and supplies, but a flying corps of infantry and a wireless telegraph outfit will be provided for. At Vienna, the Austrian post office recently made an installation of motor vehicles for handling its parcel post service. The Belgian Minister of Railways has been investigating a plan for modernizing freight delivery by substituting motor trucks for horse-drawn vehicles in this department. A society, with

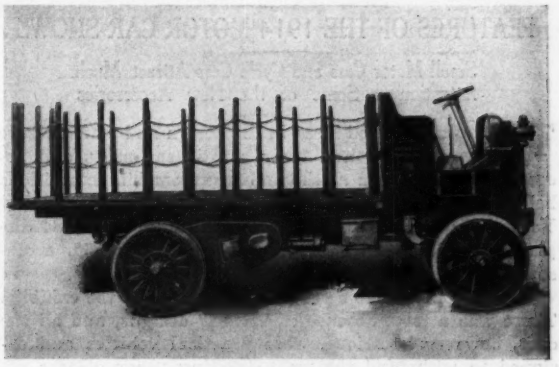
A Lauth-Juergens 5-ton chassis fitted with special type of body for carrying bottled goods in cases



A 3-ton Gramm dumping truck used by the Ottawa Gas Company for hauling coal and coke



A 3-ton Kelly truck hauling a 20-ton boiler in Erie, Pa., for a general trucking company



An Avery truck built for service in the Argentine Republic and fitted with stake body

a capitalization of $100,000, has been formed at Almeria, Spain, for the establishment of motor communication between several cities in that country. Even in African Togoland a freight motor car service is reported to have been opened over a 50-mile road for transporting palm oil, cotton and cacao from inland plantations to the railways.

Although these instances are but a few of the total number in which motor trucks have recently found favor, they have been chosen at random at widely separated points so as to show that the adoption of the truck is world-wide. The many uses to which the machines can be put in various countries has led builders and designers to direct their ingenuity toward the construction of an exceedingly large number of types of body. Truck bodies that dump a load in 15 seconds are produced for contractors, coal companies and those concerns handling excavation work on a large scale, of which there are many at the present time in Central and South America. For the haulage of freight, baggage and mail there are bodies equipped with drop frames, double platforms, hand winches, small hoists and booms.

Special types have been designed for emergency service on railroads and trolley systems to replace cars that have been derailed, lay emergency bridges over obstructions, and mend wires, while other special bodies have been created for the most convenient transportation of bottled goods, for storage warehouses, for transporting lumber, as well as for handling farm and plantation produce, hardware, furniture, meats and provisions, oil, explosives, guns and ammunition. In New York it is no longer an unusual incident for an automobile hearse to lead a long line of motor-driven funeral coaches through the streets. Traveling minstrel shows and theatrical companies have already showed preference for the motor truck to railroad trains, the advantage being that the property and effects need not be expressed from one point to another, but can be stored permanently in the truck, while the members of the company can travel at their convenience on the railway and find the truck awaiting them at their destination. Such trucks, being not much more than vans, do not, however, represent the degree of elaboration secured not long ago by an enterprising cigar company which placed in service a truck built in imitation of a retail cigar store. This truck, carefully fitted out in every detail, was designed to cover many miles a day in delivering supplies to branch stores of the concern, meanwhile serving effectively as an advertisement for the company.

The aim in general has thus been not only to provide a reliable motor, substantial construction and easy running parts, but, exclusive of speed and durability, to make the motor truck wider in its appeal than the horse-drawn vehicle ever was. As a result, it is meeting the needs of buyers in almost every industry and in virtually every country in the world.

Gramm 2-ton truck with special body for repairing overhead street railway wires in Montreal, Canada

A Gifford 2-ton truck hauling shingles over a country road almost impassable for horses

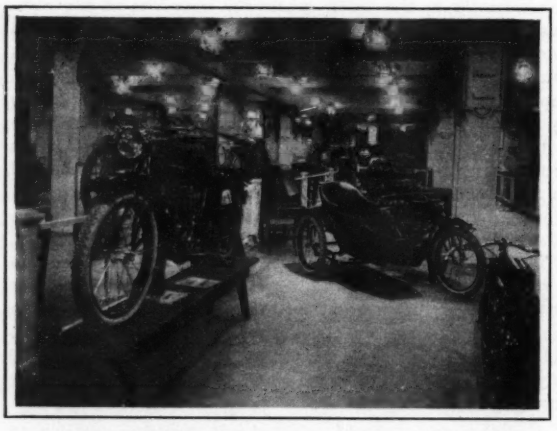
FEATURES OF THE 1914 MOTOR CAR SHOWS

Small Motor Cars and Cycle Cars Attract Much Attention — Some of the New Accessories

THE most advanced ideas in the design and manufacture of motor cars and their constituent parts and accessories were shown at the annual automobile expositions held early this year at New York and Chicago. At New York there were, all told, 352 exhibitors, of whom 84 displayed gasoline and electric passenger cars; 266, accessories and parts, and 12, motorcycles.

Utility appeared to be the dominant note in the exhibits. There was a total absence of "freak" designs, and all the cars, however luxurious, were practical vehicles and designed to withstand the most exacting usage. More attention was paid to the comfort of the driver, some cars being so designed as to enable him to enter and to reach his seat directly, instead of being obliged to climb in from the opposite side and over the other front seat passenger. The cushions of the driver's seat were designed to be lifted and the steering wheel to be tilted, while extra tires carried were placed elsewhere than on the running board.

Almost rivalling the larger cars in interest were a number of small motor cars and cycle cars which were given more prominence and appeared to greater advantage than ever before. The smaller models were designed to meet



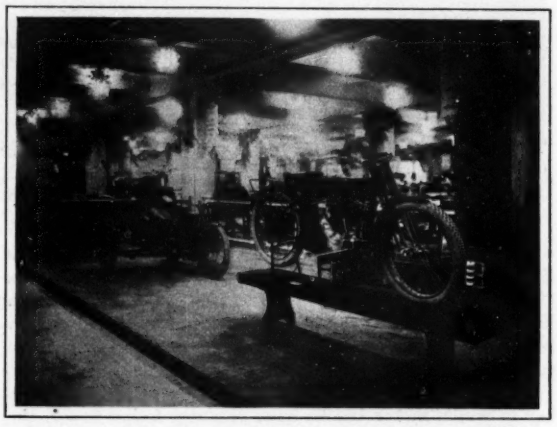
A corner of the booth of one of the largest exhibitors of motorcycles at the New York Motor Club Show recently held

the demand for cars by those unable to purchase machines of average size. One of these small models exhibited carried two passengers and was offered at the extremely low price of $395. While exceedingly light, this model had a tread of standard dimensions. Another example was offered at $375. The cycle cars could usually be distinguished from the small-sized motor cars by their exterior belt drive, motorcycle motor and extremely low suspension.

Accessories and new ideas in motor car equipment also formed an important feature of the exhibition. A striking innovation was a patent motor car top which a motorist can raise with one hand at no tax to his strength and without leaving his seat. Shock absorbers were displayed that were so efficient that a jar of water placed in the car to which they were attached was but slightly disturbed when the machine was subjected to a sudden shock.

One of the chief dangers in motoring lies in the sudden turn or stop that one car may make while leading another, and to eliminate this an effective signal for warning the rear car was shown. This device, which is controlled by the driver, indicates whether he intends to go to the right or left, or to stop entirely.

The frequent use made of valuable motor cars by chauffeurs and other persons without the knowledge of the owner, and the easy theft of machines standing alone on busy thoroughfares, have led to the production of a number of locking devices. One of the most interesting of those at the New York exhibition is connected to the battery or magneto, and enables the owner to effectively "lock" the spark. Anyone who then attempts to tamper with the starting mechanism is not only unable to start the motor, but causes the ringing of a bell signal, which, once started, cannot be stopped except by the rightful owner who has set the combination. Another invention along the same line consisted of a "speed lock," which



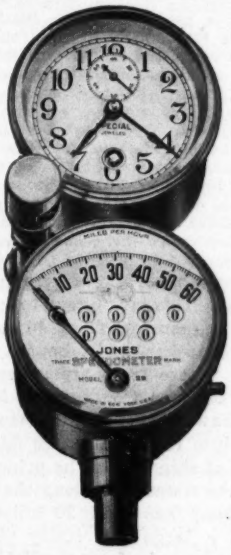
Another view of the exhibits in the motorcycle section which received almost as much attention as was paid to the motor cars

operates in conjunction with the speedometer and cuts out the ignition when the machine exceeds a given speed.

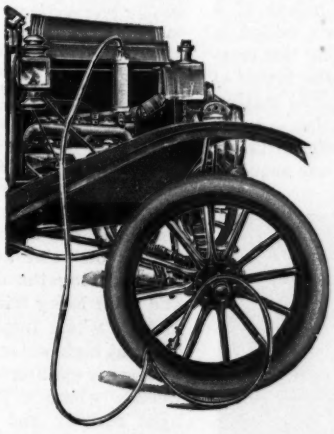
Other useful accessories and supplies exhibited included watch-sized testers for determining at any time the air pressure in tires; combination locks and speedometers; automobile varnishes capable of resisting any amount of water, soap or other destroyers of surface finishes; "motometers" to warn of excessive heat in motors; gauges for the quick and easy measuring of gasoline in tanks; vaporizers to insure proper supply of gas for the rapid starting of motors; metal bars to perform the double function of resting and warming the feet; windshields composed of three sections of glass for affording views of the road at various distances; reflectors and mirrors possessing a peculiar gold tint for increasing the clearness of automobile lamps; headlights which throw a long, slender, non-blinding pencil of light on the road ahead and at the same

Side cars for motorcycles are increasing in number. Those shown here can be quickly attached to any machine

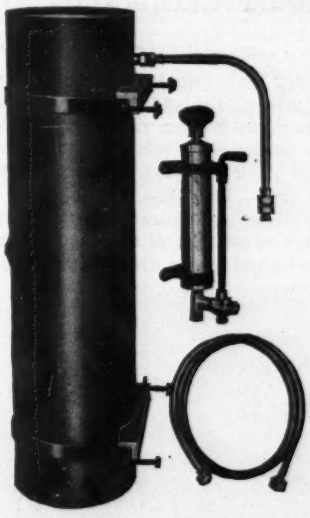
time a short fan-like diffusion of light over the radiator and front wheels of the car; filtering devices for the economical separation of water and dirt from gasoline; quick-measuring oil pumps; combination danger lamps and license plate holders; and instruments for indicating not only the exact distance that a machine travels, but the various speeds reached, the number of stops made during the distance traveled, and how long the stops lasted.



Automobile time-clock and speedometer in handy combination

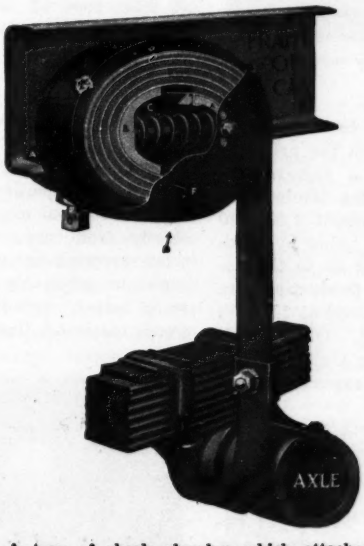


This tire pump fits into a spark plug hole; is driven by the compression of gas



Reserve oil outfit for use on long trips. Motorists can pump while traveling

The "Motometer," a gauge for indicating heat in motors



A type of shock absorber which attaches to both car spring and chassis

Watch-sized pocket pressure tester which screws on tires

Lock to prevent sparking, and thus the use of a machine unknown to the owner

Danger lamp and license number plate holder combined

The "Auto Signalite," a rear danger signal which flashes "Left," "Right" and "Stop," and illuminates the license plate

A BRIEF GEOGRAPHY OF NICARAGUA

(*Continued from page 72.*)

planters make what is called "dulce," which consists of the juice of the cane, usually extracted by means of a native-made wooden sugar mill driven by oxen, boiled in large kettles and formed into loaves by pouring the crystalized juice into deep round holes bored in the trunk of some tree. This sugar is very rich in saccharine matter, but full of impurities and of a very dark color. A by-product of several of the sugar factories is arguardiente, the principal native drink. Special distilleries are required

Native shack of rubber hunters—the only shelter needed is protection from the rain

for making this liquor, all of which is sold to the Government by the distillers or to parties to whom the privilege has been granted, as the retail sale is a Government monopoly. According to the returns of the Minister of Finance the quantity produced averages about 1,000,000 liters annually, valued at about $200,000. Other by-products are alcohol and molasses. No returns as to the domestic consumption of sugar, or the total production, are kept, but the total exports in 1907 were valued at $570, in 1908 at $87,373, and in 1909 at $182,128. Of the last total the United Kingdom took $73,545, the United States $54,446, and Honduras $39,162. In 1910 exports fell off sharply to $15,212.

CACAO.—Although cacao grows throughout the republic it is not under very extensive cultivation, being grown chiefly in the district of Rivas and to a slight extent along the River San Juan. The quality is good, and trees near Rivas bear on an average two pounds of beans per annum. Many trees, however, die under three years of age, necessitating replanting, and full grown trees are subject to canker and the ravages of wood-boring insects. Most of the crop is consumed within the country, exports in 1909 amounting to only $15,096, of which a third was sent to Salvador, a fourth to the United States, and the rest to Germany, the United Kingdom and Guatemala. In 1910 exports were valued at $20,854.

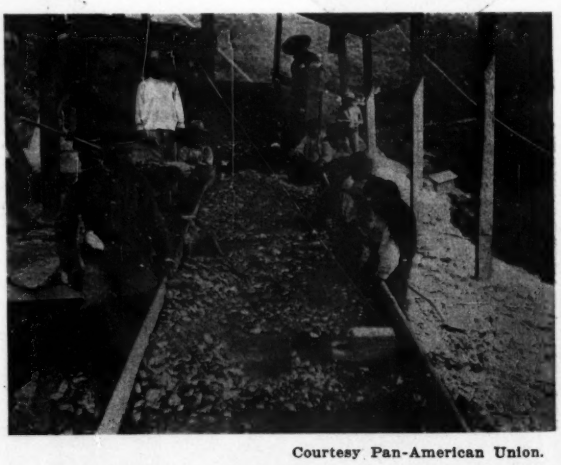
COTTON.—The aboriginal Indians in Nicaragua cultivated cotton and manufactured cloth from its fiber, and during the period of high prices occasioned by the Civil War production was resumed. It has since continued on a fluctuating scale, the crop being considerably damaged as a rule by blight, insects, etc. Exports in 1909 were valued at $36,529, and in 1910 at $10,974.

INDIGO AND COCHINEAL.—During the colonial period and the first half of the nineteenth century indigo and cochineal were grown extensively and constituted for a long period the principal articles of export after gold and silver. Both have long since been superseded by artificial dyes and are no longer cultivated. Mr. E. G. Squiers was so fortunate as to find plantations still under cultivation, and in Vol. II, pp. 94 to 96, he gives an admirable account of the manner in which indigo was planted, harvested and prepared for market. An illustrated description of the cochineal industry, as it is still carried on upon a limited scale in the Canary Islands, was published in DUN'S INTERNATIONAL REVIEW for May, 1910.

OTHER AGRICULTURAL PRODUCTS.—*Tobacco* is grown in several districts, is of good quality, and its cultivation could be greatly extended, as there are large tracts of land well adapted to this crop. At present the best grade is produced on the island of Omotepe, in Lake Nicaragua. The total quantity grown suffices for domestic consumption, which is very large, as everyone smokes—the women as well as the men. *Corn* and *Rice* are extensively raised for local consumption, the former yielding three crops a year. *Cocoanuts* grow to profusion, but have not as yet been cultivated systematically on a scale sufficient to cause them to figure in the export returns. The remarks on this staple in the article on Panama, appearing in the February number of DUN'S INTERNATIONAL REVIEW, also apply to Nicaragua. Nicaragua is also suited for the production of limes, oranges, pineapples, mangos, melons, grapes, guavas and grenadillas, as all travelers speak of the lusciousness of these fruits when grown there, but at present they are raised only for local consumption.

MAHOGANY.—The most important of the forest products of the country is mahogany. This tree grows to great size in Nicaragua, frequently measuring from 40 to 50 feet in height below the first branches, and from 9 to 12 feet in diameter at the base. These trees are generally felled during the dry season, between October and May, and after being trimmed are drawn by oxen to the nearest stream, where they are made into rafts which are floated down at high water to the port of shipment. The principal mahogany cutting district in the country is along the Rio Grande where a Boston company has built 20 miles of light railway and established a large and costly plant, employing chiefly negro laborers brought from the Bahama Islands under contract. The Government returns do not report the value of mahogany exports from the Atlantic coast, but the Custom House at Bluefields gives the amount of duty paid by the above concern. In 1903 this was $16,130, at the rate of a dollar per log. As these logs were worth at least $50 each, the exports that year must have been not less than $806,500 in value. On the Pacific Coast the mahogany exports are small, seldom exceeding $5,000 in declared value.

OTHER FOREST PRODUCTS.—*Cedar* is very abundant in Nicaragua, growing to immense size, and producing wood of the finest quality. It is used for making pencils and cigar boxes, but exports, so far as reported, are small and chiefly from the Pacific coast. There are many other trees growing in profusion in Nicaraguan forests that could be profitably exploited if transportation facilities were better, including the long-leaved pine, oak, Brazil wood, rosewood, lignum vitæ and zapotillo—the last being



Courtesy Pan-American Union.

Sorting gold ore in Nicaragua. Placer mining is carried on in many parts of the country

the only wood that resists the teredo or boring sea worm. There are also several valuable woods suitable for railway sleepers, many dye woods, and numerous varieties of palms producing oleaginous nuts. Other vegetable oil plants also abound, including the castor oil plant.

RUBBER.—The production of rubber is gradually increasing in Nicaragua in spite of the reckless slaughter of the trees by inexpert tapping. The rubber tree in Central America is called *hule*, and grows to a height of 50 to 60 feet. The collectors are called *huleros* and either cut the tree down, or scrape off the bark for a strip 8 to

10 feet wide entirely around the trunk, or else slit it deeply with vertical and oblique channels. The two latter methods are liable to kill the tree in a short time, so that all three are very destructive. The exports of rubber from Nicaragua have ranged from $200,000 to $300,000 for many years past, the total reported for 1910 being $346,182.

CATTLE RAISING.—One of the most important industries in Nicaragua is cattle raising, many of the richest land owners devoting their estates solely to this purpose. The annual production not only supplies the large domestic consumption, but affords a considerable exportation, both of live cattle to neighboring republics and hides to the United States and Europe. According to an estimate made several years ago there were approximately 313,000 cattle in the country. Exports of hides in 1910 amounted to $196,451.

OTHER INDUSTRIES.—Manufacturing industries are for the most part small and engaged in producing articles for domestic consumption. There are tanneries in the departments of Leon, Chinandega and Segovia; numerous native establishments making hats, hammocks and ropes; some small factories making boots and shoes, furniture and tiles; some brickyards, using a little machinery; many small establishments making soap, cigars and cigarettes; a few small breweries, one ice-making plant, one textile factory. There are also native artisans making cloth, pottery, and carvings from cocoanuts, calabashes and horns of much interest to tourists.

DEPARTMENTS AND PRINCIPAL PLACES.—Nicaragua is divided politically into twelve departments, three comarcas and two districts, or seventeen major divisions corresponding in some respects to the States and Territories of the United States. A complete list of these follows:

DEPARTMENTS.		
Managua	Masaya	Granada
Carazo	Rivas	León
Chinandega	Chontales	Matagalpa
Jinotega	Nueva Segovia	Bluefields
COMARCAS.		
Rio Grande	Cabo de Gracias á Dios	San Juan del Norte
DISTRICTS.		
Prinzapolca	Siquia	

In most instances the capitals of these divisions bear the same name, the exceptions being: Jinotepe, capital of the Department of Carazo; Juigalpa, capital of that of Chontales; Ocotal, of Nueva Segovia; Rama, of the District of Siquia. The bulk of the population of the country lives in the comparatively large towns in the western part, between the lakes and the Pacific, the towns being smaller in size the farther one goes northward and eastward into the mountain region. Along the Atlantic

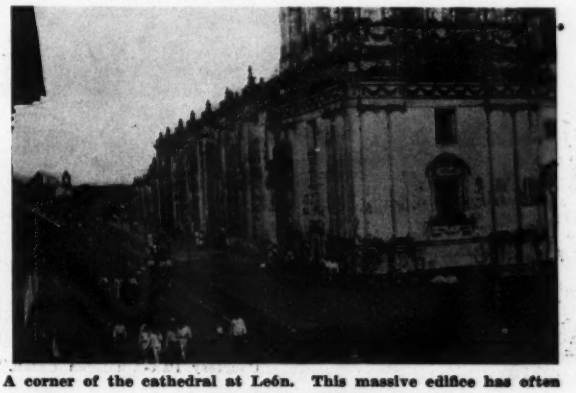
Courtesy Pan-American Union.

Scene at Corinto, the principal seaport of the Republic on the Pacific

coast several points having a relatively small population are of considerable commercial importance.

MANAGUA.—In 1852 Managua was made the capital of the country as a compromise between Granada and León, the two largest cities and bitter rivals for the honor. It is situated about midway between them, on the southern shore of Lake Managua, and is very nearly at the center of the volcanic ridge running parallel to the Pacific coast, on which most of the population of the country is found. It is connected by rail with Granada, on the one hand, and with the port of Corinto on the other. The city itself, while well located to be the commercial metropolis of the country, has never fully attained this position, although the only bank in the republic and a considerable number of large importing houses are located there. There is a good public market, but no cathedral or theatre. The public buildings are not pretentious, the principal ones being Campo de Marte, or the president's residence, and La Loma, the arsenal. A large house erected by ex-President Zelaya for his family stands near the presidential residence. The houses are for the most part one story high, with red tile roofs. The streets are about to be repaved under authority of the National Government. There is a pretty Parc Central and the town is lighted by electricity. Its population, according to the latest available sources, is 34,872. There is an American Consul here.

LEÓN.—The largest city in the republic, and during colonial times its capital, León is situated on a broad plain about midway between the northern end of Lake Managua and the Pacific Ocean. The city was originally founded, very early in colonial times, near the foot of the volcano of Momotombo at the northern end of Lake



A corner of the cathedral at León. This massive edifice has often been used as a fortress

Managua. An eruption of the mountain, which did great damage to the city, led all its inhabitants, under the lead of the Bishop, to remove to the present site, some 25 miles distant. The location was wisely selected, not only being beyond the danger zone of the great volcano, but on the highway to the fine cattle country of the interior highlands and the rich coffee lands of Matagalpa. The produce of these regions comes to the city, which is therefore an important mercantile and distributing center, and one visited by all foreign salesmen coming to the country. It is situated on the Government railway, 35 miles from the port of Corinto. The city is a busy place, its inhabitants being industrious and its markets largely attended. The streets are straight and fairly level, but paved with old-fashioned cobblestones as yet. The Cathedral of León is one of the largest in Latin America. It was a century in building and occupies an entire square, its front extending the whole width of the grand plaza. Architecturally it is hardly to be admired, but it is certainly most solidly built, having stood since 1743 in spite of storms, earthquakes, battles and sieges. León is famous for its annual processions of the *Semana Santa*, or Holy Week. These go to the Indian town of Subtiava, nearby, over a road covered with sawdust laid out in vari-colored designs like a huge carpet, and under innumerable arches and festoons of flowers and flags. Rivalry with Granada has been constant for centuries, frequently leading to civil wars, in some of which many of its best buildings were injured or destroyed and hundreds of its citizens killed. Notwithstanding these losses it had a population in 1906 of 62,569. The Province of León, of which it is the capital, is the most densely populated of any in the republic.

GRANADA.—Founded in 1524, Granada appears to have been a much more populous and important city during Spanish colonial times than it is at present. Situated at the northwestern end of Lake Nicaragua, it quickly became the assembling point for the transit trade across the isthmus, merchandise being brought here from all parts of Central America by mule trains and then transported across the lake and down the River San Juan by boat. The decree of the Spanish Government in 1595 prohibiting the colonies from cultivating grapes, olives or anything else that was an industry in the mother country, injured the commerce of the city, as did the decree permitting goods to be shipped between the American colonies or to Spain by any route. In 1665 the city was sacked by the Dutch pirate Davis, and in 1856 it was entirely burned by Henningsen, a lieutenant of the filibuster Walker, at the close of a sensational siege. Although rebuilt by its enterprising citizens, the city has never regained the splendid position it occupied in colonial times. It has an unusually large and well-appointed public market, costing some $200,000, which was built in 1891, and a horse car line dating from about the same time. Its population was officially estimated in 1905 to be 35,000, a figure that seems more probable than the 17,000 stated by many authorities.

MATAGALPA.—Situated at an altitude of 2,000 feet, in the hilly region north of Lake Managua and in the heart of a rich coffee growing and cattle-raising district, Matagalpa is often called "the pearl of the republic." It is a very prosperous little city, well built and well kept up, and growing rapidly in population and wealth. The principal property owners in the vicinity are Americans and Germans; coffee, rubber, cacao and cattle being the prin-

cipal sources of wealth—apart from a few mines back in the hills, owned chiefly by Englishmen. The climate here is very pleasant, ranging in temperature from 65° to 85° Fahr., with the mornings and nights cool enough to render blankets necessary. There are three main roads to Matagalpa from the lake region; from Managua by way of Savannah Grande, from La Paz, and from León—the last being the most frequented. The trip is made by horse or mule back, and requires at least a couple of days, 24 hours being spent in the saddle. A railroad is projected from Momotombo or some other point on Lake Managua, which, when built, will greatly increase the prosperity of this progressive district. The population of Matagalpa is reported as 15,749. There is an American consular agent here.

CORINTO.—The principal seaport of Nicaragua on the Pacific side is Corinto, a comparatively modern little town of about 1,400 in-

Courtesy Pan-American Union.

Calle Comercial at Bluefields, the principal port of entry on the Atlantic

habitants. It has a deep, almost landlocked harbor, which was the fact that led to its selection as the terminus of the railroad and, in fact, created the town—the former port being Realejo, some distance up the river and now almost deserted. It has a substantially built pier, under the control of a New Orleans company, but only one steamer at a time can come alongside. The town itself is built of wood, with red tile roofs, and the streets are unpaved. Travelers usually leave as soon as possible for the interior, the one through train for Managua starting early in the morning, and a train for León early in the afternoon. Practically all the Pacific coast trade of the country is handled at this port, so there are a few commission merchants located here and several stores. There is an American Consul at the port.

BLUEFIELDS.—The largest and most prosperous port on the Atlantic coast is Bluefields, situated at the mouth of the river sometimes called by that name, and also known as the Escondido. The name, which is also spelled Blewfield, is said to be derived from that of the Dutch pirate Blieveldt. Originally a rendezvous for buccaneers and pirates, it became the capital of the Indian Kingdom of Mosquitia, or the Mosquito Coast, and so continued until President Zelaya annexed the territory to Nicaragua. The severe port dues imposed by Zelaya nearly ruined the town for a time and led to two revolts of the planters that were put down, a third resulting in the overthrow of Zelaya. The river is lined with prosperous banana plantations as far inland as Rama, the head of navigation for ocean steamers. The town has the reputation of enjoying the most healthful climate on the Atlantic coast, and is built on the mainland, facing the almost landlocked Bluefields Bay. Steamers can come alongside the pier to take on and discharge freight, and the traffic in bananas is very heavy and increasing steadily. The heavy mahogany exports from along the Rio Grande are officially reported at the Bluefields custom house. Exports also include rubber and gold, while imports comprise a great variety of supplies for the plantations and mines, as well as foodstuffs, hardware, clothing, etc. Owing to the lack of satisfactory communications with the interior, the bulk of the provisions for Bluefields and vicinity are imported—even such articles as coffee, beans, sugar and maize being brought from the United States. The city of Bluefields proper is situated six miles from the port; the latter is safe for vessels drawing less than 12 feet, a bar preventing those of large tonnage entering. An American Consul is located here. The population was reported at 4,706 in 1906, but is now probably much larger. An American paper is published here.

RIVAS.—One of the finest old cities of the republic is Rivas, situated on the isthmus between Lake Nicaragua and the Pacific close to its narrowest point. The old Transit Road passed through this town, which was commercially and strategically of great importance from 1850 to 1860 and the scene of many battles during the civil wars of that period. At present it is less important, but still is a wealthy, busy town, and the center of a rich cacao district. It has a number of stores and is usually visited by traveling salesmen. The population is estimated at about 14,000. The town can be reached by the transit road from San Juan del Sur, or by lake steamers from Granada, with a short road journey inland from the lake.

GREYTOWN or SAN JUAN DEL NORTE.—During a large part of the history of Nicaragua this port was the most important gateway to the country on the Atlantic side. Formerly it possessed a deep harbor, and a steady stream of commerce was carried on by means of river steamers up the San Juan and across Lake Nicaragua. A change in the course of the river, which cut a new channel to the sea, known as the Rio Colorado, destroyed the harbor for a time, but the Nicaraguan Canal Construction Company repaired the damage by constructing an artificial entrance. The abandonment of this work, however, resulted in the harbor rapidly silting up and a sandy bar across its entrance has reduced the depth of water there to a foot or two. Ocean steamers, therefore, no longer stop here, but freight is carried to this port by coasting steamers from Bluefields, and up the river by boats operated at present by the Government. The trip is easily made in the rainy season, but during the dry season often necessitates three or four lighterages around rapids and occupies from six to seven days for passengers. Traffic by this route is, therefore, small and the place is at present unimportant.

MASAYA.—The capital of the Department of that name, is situated about midway between the cities of Managua and Granada on the main railway line, and at the foot of the volcano of Masaya. Population, 13,023.

JINOTEGA.—Capital of the Department of the same name, this city is situated in the highlands north of Matagalpa, with which it is connected by road. Coffee and cattle raising are the chief industries in the vicinity. Population, 13,899.

CHINANDEGA.—Capital of Department of same name and situated on the railway, 13 miles from Corinto, Chinandega is the first large town after leaving that port. It is near the volcano Viejo. Population, 10,542.

ESTELI.—A town of 8,281 inhabitants in the Department of Jinotega. Best reached by cart road from León.

JINOTEPE.—Capital of the Department of Carazo, and situated on the branch line of railway running from Masaya to Diriamba. This district is called "Los Pueblos" and is famous for its coffee plantations. Population, 9,317.

OTHER LARGE TOWNS.—Among the other towns having some commercial importance may be mentioned the following: SOMOTO, population 8,181, in the Department of Nueva Segovia near the Honduran frontier; BOACO, population 10,581, in the Department of Chontales, situated in the hills north of the western extremity of Lake Nicaragua; METAPA, population 8,279, in the Department of Metagalpa, situated between that city and León on the line of the proposed railway; VIEJO, population about 5,000, situated near Chinandega; DIRIAMBA, population about 4,500, near Jinotepe and the terminus of the railway line from Masaya to "Los Pueblos"; LA PAZ, population 6,000, in the Department of León, near that city and on the main railway line, where a branch line starts for Momotombo; MOMOTOMBO, at the western end of Lake Managua,

Photo by Underwood & Underwood.

Main Street, Bluefields. This is the leading shipping port for bananas and mahogany

and 8 miles from La Paz—near volcano of same name, and point from which railroad to Matagalpa will probably start.

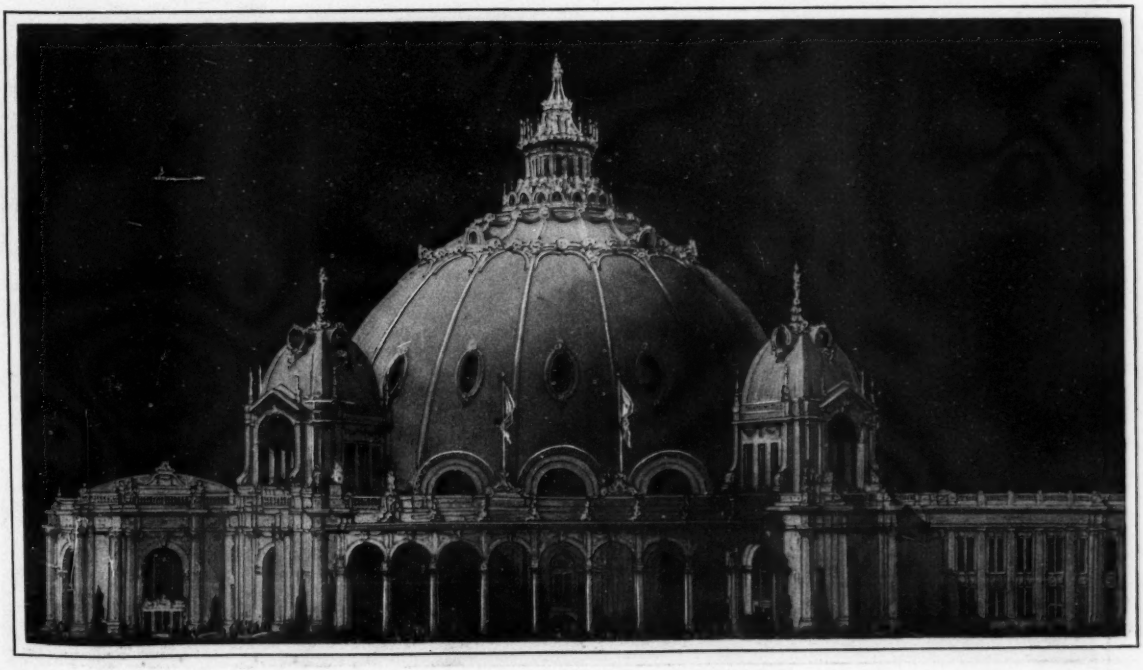
MINOR SEAPORTS.—On the Atlantic coast fruit steamers from New Orleans call regularly at CAPE GRACIAS Á DIOS, situated close to the cape of the same name and at the mouth of the River Segovia. It is a shipping center for a growing banana district and the Pis-Pis mining district. There is an American Consul at this port. PEARL LAGOON (Port Pearlas), a banana shipping point near Bluefields, reached by motor launches and small steamers. MONKEY POINT, a small port reached by coasting steamers, situated midway between Bluefields and Greytown; terminus of proposed railway from San Miguelito on Lake Nicaragua. On the Pacific coast the small port of SAN JUAN DEL SUR is still visited by most coasting steamers which here discharge and take on passengers and freight for Rivas. There is no wharf and unloading is done by means of lighters. There is an American consular agent here.

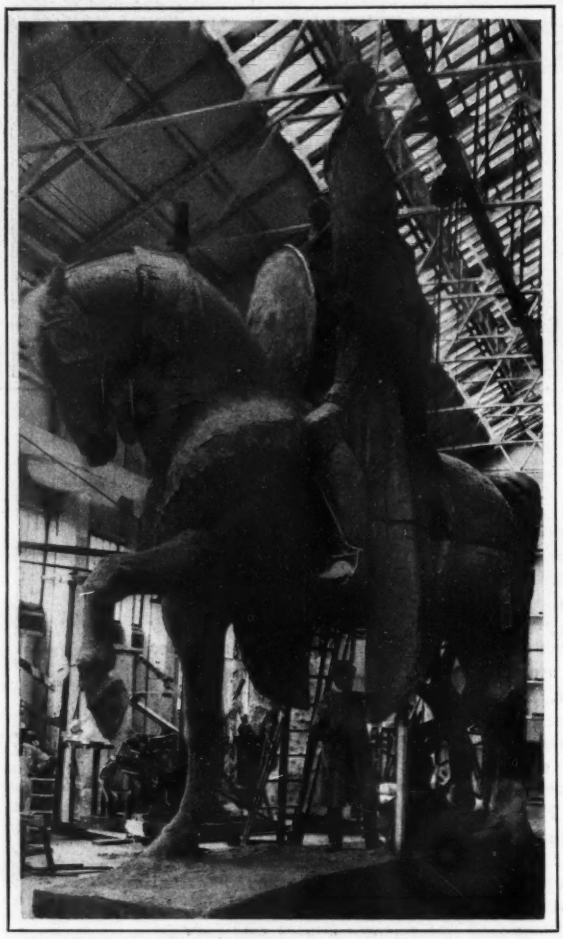
THE PANAMA-PACIFIC EXPOSITION OF 1915

WORK is now progressing rapidly on what will undoubtedly be the greatest world's fair held during the coming year—the Panama-Pacific Exposition at San Francisco, to celebrate the opening of the Panama Canal. The illustration at the top of this page shows the panorama of the exposition as it will appear when completed. The buildings and grounds face north and extend for nearly three miles along the harbor, being located just inside the famous Golden Gate entrance from the Pacific Ocean. The illustration scarcely conveys an adequate conception of the immense size of the exhibit palaces or the height of many towers, of which the most lofty will rise 430 feet above the street level.

The building shown at the foot of this page is the Festival Hall, where more than 190 conventions will be held while the exposition is in progress. These will be attended by delegates from all parts of the world, representing organizations interested in almost every branch of human progress. The structure will be 380 feet long by 200 feet wide, with wings extending the extreme width to 280 feet, and will contain a vast auditorium with a huge stage.

The exposition buildings will be arranged in three groups—the center group comprising fourteen palaces devoted to general exhibits; with the concession buildings, occupying 65 acres, at the left; and the pavilions of the various States and foreign nations at the right, the latter rising in terraces upon the slopes of the Presidio reservation. There will be several great courts, around which the larger palaces will be placed, while the grounds will be made attractive by thousands of palms and other trees, and great numbers of rare shrubs and plants. The reproduction of architect's designs and other illustrations shown on this and the four following pages are copyrighted by the Panama-Pacific International Exposition.





THE NATIONS OF THE EAST

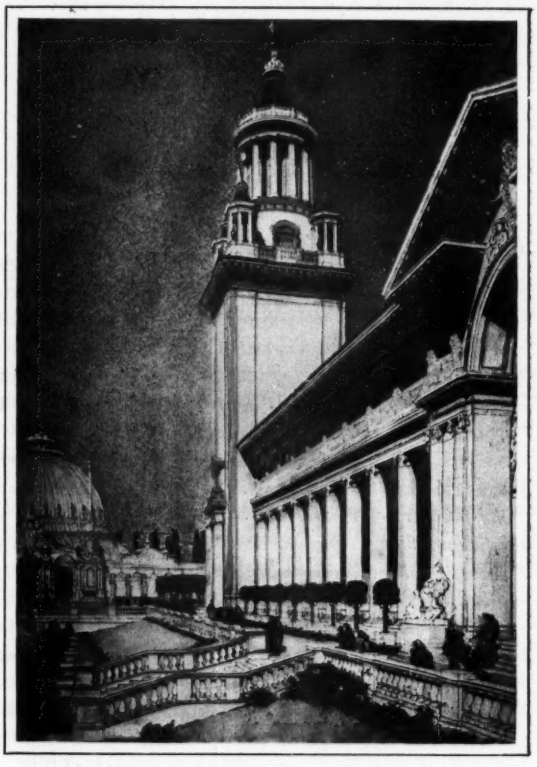
AT THE eastern end of the largest and most imposing of all the Courts of Honor—the "Court of the Sun and Stars," as it will be called—will stand a huge commemorative arch greater in size than the Arc de Triomphe at Paris and called the "Arch of the Rising Sun." Surmounting this arch will be a colossal sculptural group representing the Nations of the East. The upper illustration on this page shows the Tibetan horseman, one of the heroic figures in this group. The illustration shows the figure in course of construction, and its gigantic size can be appreciated by comparing it with that of the sculptor beneath it. The illustration at the foot of the page shows the head of the elephant forming the central figure in the group. Its size can be estimated from that of the freight car behind it. At the present time more than 4,000 men are working upon the exposition buildings, of which the great Machinery Palace is already completed, while construction work on the other ten main buildings is from 25 to 90 per cent. complete.

THE NATIONS OF THE WEST

OVER the "Arch of the Setting Sun," at the western entrance to the Court of the Sun and Stars, will be placed a sculptural group representing the Nations of the West. This is a composition by three noted sculptors and depicts the great exploring and colonizing races of the Occident. The central feature of this composition—which is shown in the illustration at the foot of this page—is a typical "prairie schooner" drawn by oxen, such as was used by the westward-bound pioneers of the last century in their overland journey across the Continent. In front of the wagon stands "The Mother of To-morrow"—of which an enlarged picture is shown at the right—while two boys, "the Hopes of the Future," and an allegorical figure representing "Enterprise," surmount the wagon. Accompanying the wagon are four equestrian figures representing the Latin-American, the Englishman, the Frenchman and the Indian; and four pedestrians representing a German, an Italian, an Alaskan and an Indian squaw—all of the figures being symbolical of the early pioneers and the Indians who preceded them.

THE ARCH OF THE RISING SUN

THE howdah upon the elephant in the group of statuary surmounting this arch will be 188 feet above the pavement of the court, the group itself being 42 feet high.

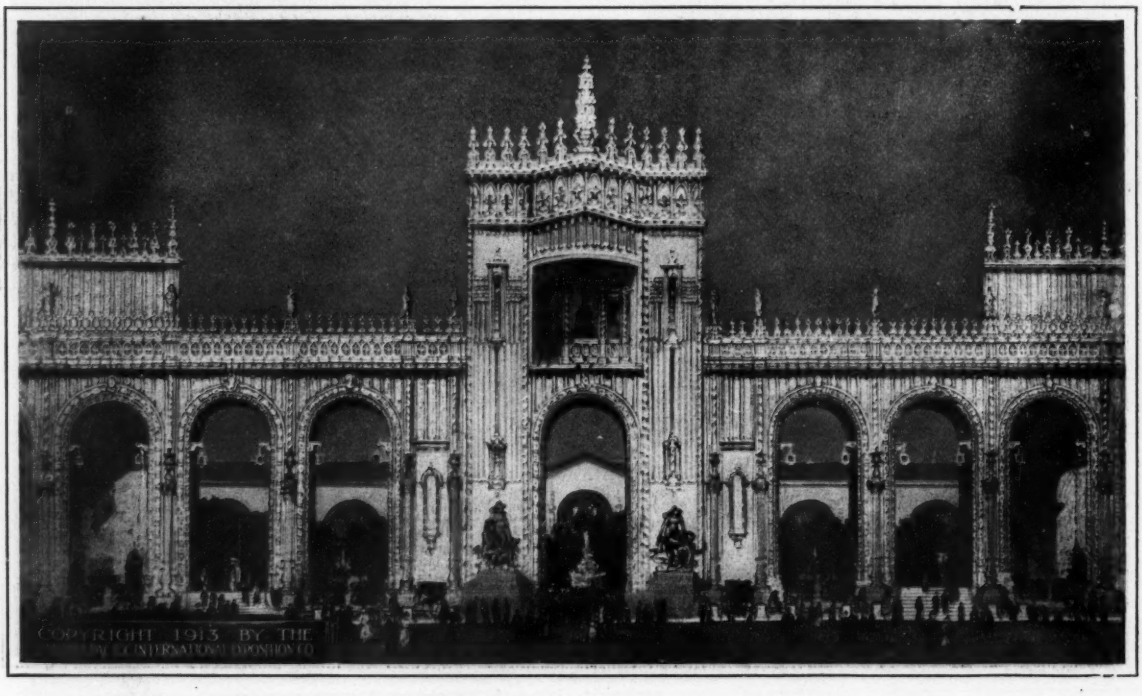


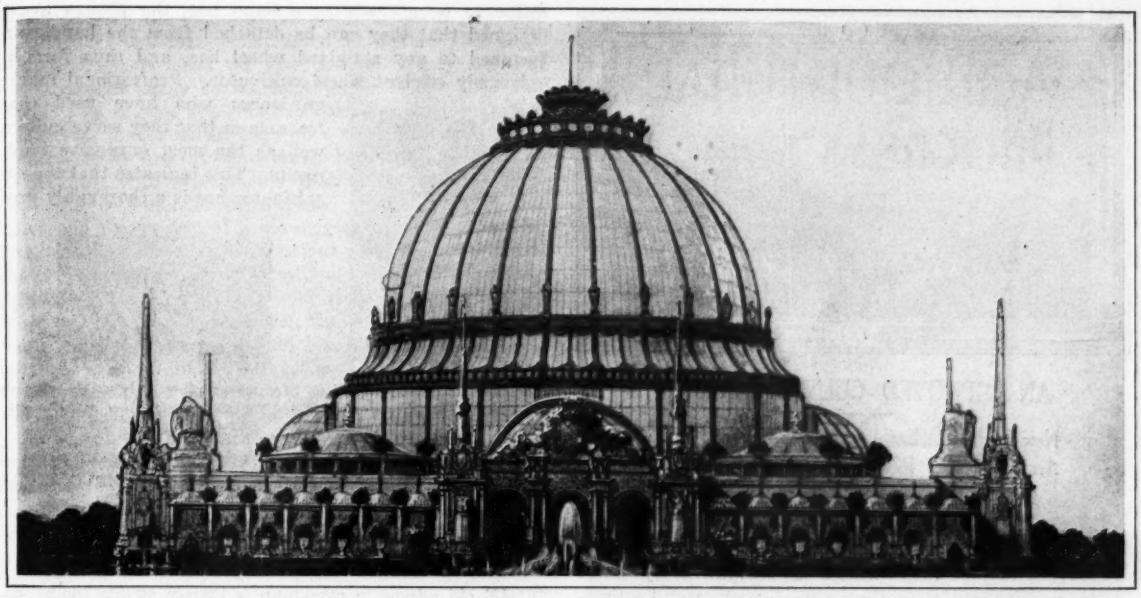
THE COURT OF PALMS

THIS court will be flanked by two Italian towers, one of which is shown in the illustration, each 40 feet square and 200 feet high, and identical in architecture.

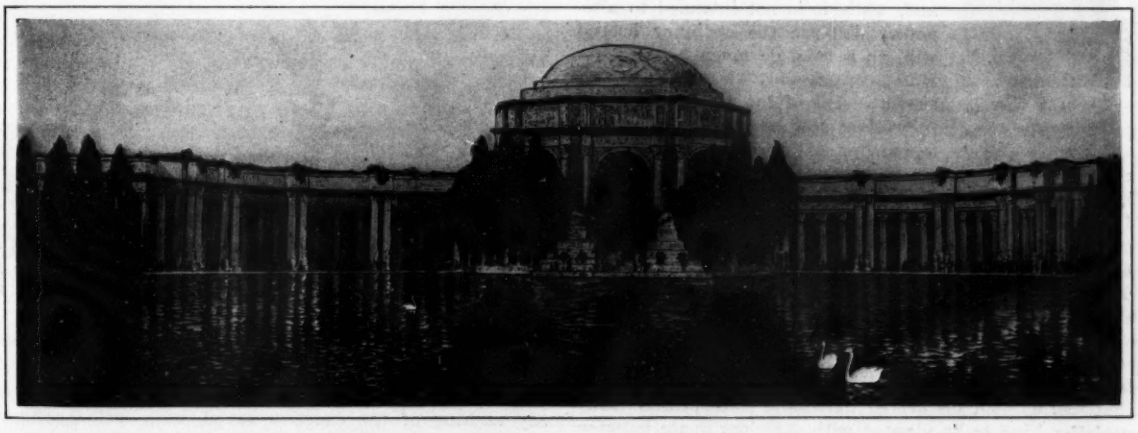
FACADE OF THE EAST COURT, OR COURT OF ABUNDANCE

THIS is thought by many of those connected with the exposition to be one of the most beautiful of its architectural creations. The designer intended it to portray the splendors of oriental architecture, hence the lavishness of its decorations. Palms and tropical plants will form a fitting background to the views in every direction.





THE Horticultural Building, shown above, will be composed almost entirely of glass and will rank as one of the largest structures of the kind ever erected, being 630 feet long, 295 feet wide, and 165 feet high. The Palace of Fine Arts, shown below, will describe an arc 1,100 feet in outside circumference.



THE illustration below shows one end of the Court of the Four Seasons. In the half dome in the background will be placed a group of statuary, and at each of the four corners of the court will be a niche containing sculptures typifying the four seasons—Spring, Summer, Autumn and Winter.

AN IMPROVED CULTIVATOR HOE

New Implement Enables Growers to Work Easily Around Plants Requiring Delicate Cultivation

Light and easy to handle

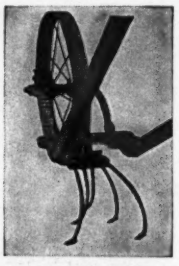
ALTHOUGH countless efforts have been made to improve the design of the old-fashioned garden hoe, it is only within a comparatively short time that a really successful substitute for that important implement has been produced. The new tool, which is known as a cultivator hoe, possesses a number of entirely original features, and, while it is not intended to altogether displace the ordinary hoe, it will, as a rule, do much better work with considerably less effort. As shown in one of the accompanying illustrations this implement is made in a number of sizes and consists of curved prongs with spear-shaped points that need very little pressure to penetrate the ground, and as they are fastened to the handle by means of independent bolts one, two or three can be removed whenever desired. This is a very valuable feature when working around small plants or plants growing closely together, as with the two outside prongs left on, both sides of the plants can be cultivated at the same time.

Every gardener who has used an old style hoe knows how difficult it is to work close up to most vegetables with that tool without disturbing them, and consequently many varieties have to be planted with sufficient space between

Three-prong weeder and three and five-prong cultivator hoes that stir soil close to delicate plants without disturbing the roots

to allow of cultivation. This is especially the case with onions, carrots and similar crops which do not grow as fast as the weeds, while those, such as lettuce, with tender spreading leaves growing close to the ground are often damaged by the broad clumsy edge of the hoe or by being covered by earth. In fact numerous gardeners do the early weeding and cultivation slowly and laboriously by hand with the smallest kinds of tools.

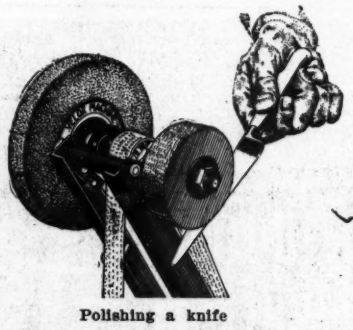
With the improved cultivator hoe, however, it is possible to thoroughly stir the soil as close to the smallest plant, as desired, without disturbing the roots, and to work under and around it in a way that cannot be done with any other tool that has yet been devised for this purpose. In addition to being used as a hand hoe, the prongs are so designed that they can be detached from the handle and fastened to any standard wheel hoe, and thus form an extremely efficient wheel cultivator. Professional market gardeners who have used these tools claim that they serve quite as well as the most expensive implements. This indicates that the new cultivator hoe is a thoroughly practical innovation, and as it is very moderate in price, it will undoubtedly become a standard tool for this class of work.



Left, cultivator hoe attached to a wheel plow. Right, showing detachable socket which provides for the wheel plow attachment

HANDY TOOL-SHARPENING DEVICES

THE old adage "a workman is known by his tools," can be applied to agriculture quite as well as to any other industry, and there is probably no kind of work in which the condition of the implements and machinery used is more important than on the farm. Everyone, of course, knows how much more and better work can be done, to say nothing of the exertion saved, with well-sharpened tools than with those that have been allowed to become dull through use or neglect, and it may be wondered why more attention is not given on the average farm to this important feature. It may, perhaps, be due to the fact that many farmers do not think themselves capable of properly sharpening such articles as mower knives, plow discs, etc., and therefore do not have this work done until absolutely compelled to do so.

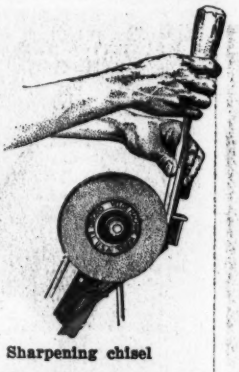


Polishing a knife

Sharpening ax

Some of the every-day uses to which the tool grinder can be put

Sharpening scissors



Sharpening chisel

Special rests are designed to hold blades at the proper angle

This belief may have been justified in former times when only the large, old-fashioned grindstone was avail-

able, but to-day the conveniences in the shape of improved tool grinders that can be obtained at a very slight expense make it possible for any one to do any work of this nature as easily as the most experienced. The new grinders, as a rule, are small in diameter, and composed of material that puts an edge on a tool with remarkable rapidity. They are operated either by foot or power and are supplied with attachments that make the most difficult grinding a matter of extreme simplicity. For instance, the sharpening of a mowing or threshing machine blade is something that few novices would care to undertake if they had only an old fashioned grindstone at their disposal. With one of the special rests that are provided with a modern grinder, however, the work becomes a very simple matter, for it will hold the blade at exactly the right angle to obtain the correct bevel, and about all the operator has to do is to supply the power and move the article being sharpened so as to present a fresh surface to the wheel. Similar attachments are provided for grinding chisels, ensilage cutters and other farm tools and implements requiring frequent sharpening, and the possession of a set of these improved fittings will form a combination that will enable any one to do this class of work as perfectly as the most experienced workman.

AN EFFECTIVE DISC HARROW

WHAT is known as a cutaway disc harrow is steadily growing in popularity in certain sections of the United States, especially in parts where new land is being broken up, its peculiar construction giving particularly satisfactory service when used for pulverizing heavy sods or clayey soils. The concave discs, unlike those of the ordinary harrow of this class, have serrated or scolloped edges, which are claimed to cut and turn the ground much more effectively than straight edges, leaving the soil in better condition with less strain on the horses.

While these implements are constructed in many different styles and in sizes from the small one-horse affair to the immense machine that can be pulled only by a traction engine, the most popular design is the one intended for the use of the average farmer. This harrow, which

A cutaway double action disc harrow which pulverizes the soil to a finer state than it is possible to secure with most other types of disc harrow, and with less draft

can easily be drawn by a team of horses or oxen, cultivates a strip of ground between five and six feet in width. There are two rows of serrated discs, one being placed in front of and working between the other. A comfortable seat is provided with every machine, and the discs are arranged in such manner that the occupation of the seat by the operator places no extra weight on the necks of the animals which are pulling the machine. This form of harrow is said to be exceedingly easy on the horses and to be capable of performing excellent work in places where the common straight edge harrow cannot be used effectively. Some farmers, making a specialty of hay, use it exclusively in reseeding old grass lands, and report that a splendid stand has been secured by going once over the fields, the harrow being followed by a heavy roller after the seed has been sown.

A USEFUL IMPLEMENT FOR ORCHARDISTS

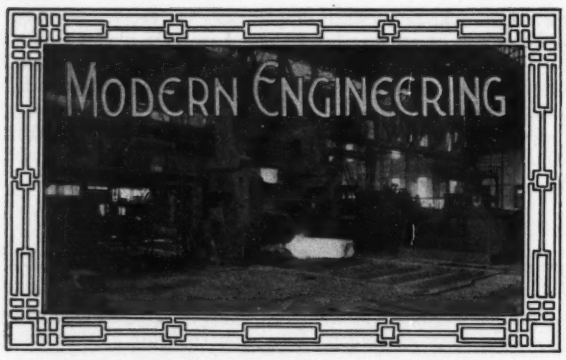
THE belief that once generally prevailed among farmers that the only care needed by an orchard beyond the planting of the trees was an occasional trimming has long since been discarded. The modern fruit grower has

On soft ground the right wheel of this plow can be lowered into the furrow, thus preventing the edge from crumbling off

discovered that if the best results are to be obtained quite as much attention in the way of cultivation and fertilization must be given to the trees as to any other crop. The market for first-class fruit is so great, and its production so profitable, that the orchardists are exerting every effort to increase and improve the quality of their crops.

It is generally recognized that a thorough cultivation of the ground beneath the trees is of much assistance in maintaining the health of the trees or vines and in enhancing the yield of fruit, but there has been considerable reluctance to use the ordinary plow because of its tendency to go deep into the ground and damage the roots. In consequence, some form of disc harrow or cultivator has been the favorite implement for cultivating between the trees, although the work done in this way is not altogether satisfactory, because if the discs are allowed to go deep enough into the ground to be of much service they almost invariably cut through all roots near the surface.

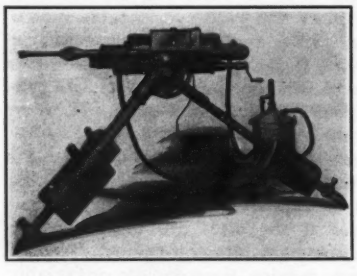
An implement which is claimed to possess all the good qualities of the ordinary field plow, without any of its objectionable features, has recently been placed on the market by a prominent manufacturer, and those who have used it express themselves as being extremely well satisfied with its service. This tool is designed in the form of a gang plow and is made with either two or three bottoms. The draft is so light that for all ordinary work two horses can easily operate it. The distinctive improvements possessed by the new plow are a pair of balancing wheels on the forward part of the beam and an ingenious lever arrangement, by means of which the depth of the plowing can be absolutely governed by a single movement and maintained at any desired level. Thus, in ground where the roots of the trees lie near the surface, a touch of the lever will prevent the plow from going any deeper than necessary, whether it be one, two or eight inches. The illustration gives the general appearance of this plow.



A SELF-CONTAINED PORTABLE ROCK DRILL

AN entirely self-contained drilling unit, consisting only of the drill and its tripod, and using gasoline as the motive power agency, has recently been placed on the market. The machine has full-floating free-piston action, and the piston rod, pistons and bit are all connected, thus forming a direct-striking piece. There is little difference, so far as appearance is concerned, between this drill and the standard air or steam drills, except for the absence of the usual auxiliary equipment.

Motive power for this gasoline drill is furnished by two cylinders opposed to each other. A piston rod, fitted with a piston for each cylinder, and on the end of which is a bit chuck, continues through the two cylinders. Make and break spark plugs for the cylinders are tripped and fired by each piston alternately. The firing of the rear cylinder drives the piston forward, hitting the rock directly with all the force of the gasoline explosion. The front cylinder then fires and the piston is sent back to its first position. The pulsator is of the two-cycle design, no valves being used, and is fired at each stroke of the piston. The cylinders are water cooled under the control of a self-contained pump operating simultaneously with the drill. A fuel and oil container is attached to the side of the drill, and is adjustable with respect to the angle at which the drill is set. When running, the lubrication of the working parts is automatic.



A rock drill consisting of drilling unit and tripod

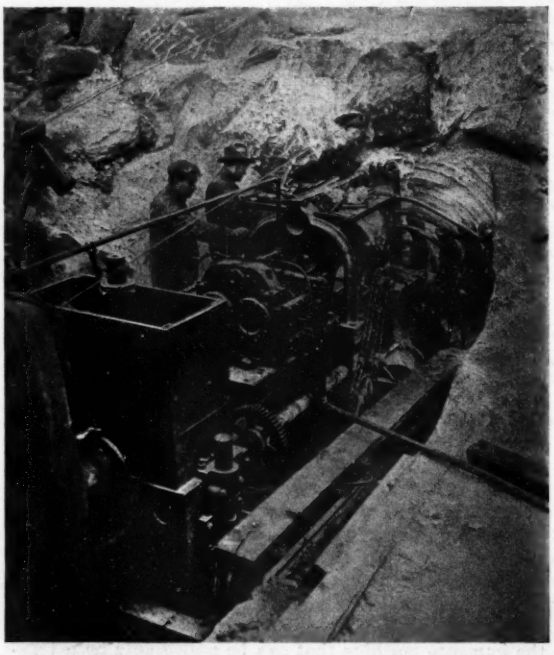
Approximately 600 blows per minute are struck by the drill, and the holes, which are drilled at any angle, range from 1⅛ to 2¾ inches in diameter. The cutting speed is under the control of the operator, but, when running at full speed, the drilling is claimed to be as rapid as that of steam or air drills of equal cylinder size and weight. The drill operates for ten hours on less than three gallons of gasoline when drilling continuously at its highest speed. It is stated that the drill has been operated during the winter with the temperature as low as 5 degrees Fahr. without losing a day.

AN ENGINE THAT EATS ITS WAY THROUGH ROCK

IN the accompanying illustration is shown a giant mechanical tunnel borer which eats its way through rock, stone and sand with almost the same comparative ease that a mole burrows its way through soft earth. The borer is practically a powerfully-built steel engine, 18 feet in length over all and equipped with 15 powerful rock-cutting pneumatic hammers which strike 1,000 blows a minute. Each hammer weighs about 25 pounds and tears with great force through any obstacle. A revolving disc, which measures about eight feet in diameter, carries the hammers around to the surface to be attacked and holds them in position for the work.

The borer is so constructed that the cutting parts work only when they are in close engagement with the earth or rock. Each is cut off automatically from further operation when its share of the work is completed. In this way, those parts which may have been attacking a more difficult surface are given time to catch up with the work as a whole.

Best described, the action of the machine is similar to that of an auger boring through wood. The movement is constantly forward, the progress depending upon the cutting tools which chip away the rock and earth. The broken rock is then removed by a conveyor to cars at the rear of the machine. One man can control the entire operation.



Equipped with powerful rock-cutting pneumatic hammers, this engine bores through stone as easily as does a mole through sand

PUMPING STATION WITH 1,000-H.P. DIESEL ENGINES

WHAT is claimed to be the most powerful installation of Diesel engines has been completed in the pumping station at the Gladstone Dock, Liverpool, England. There are five units in all, each composed of a 54-inch centrifugal pump, directly connected to a 1,000-b. h. p. engine. Each pump has discharge branches 54 inches in diameter, with two suction branches, each 40 inches in diameter. The capacity of each pump is not less than 58,000 gallons per minute and the pumps are designed to work against a maximum static head of 48 feet when running at a speed of 180 revolutions per minute. When the pumps are to be used for drainage purposes they can pump against a maximum head of 61 feet.

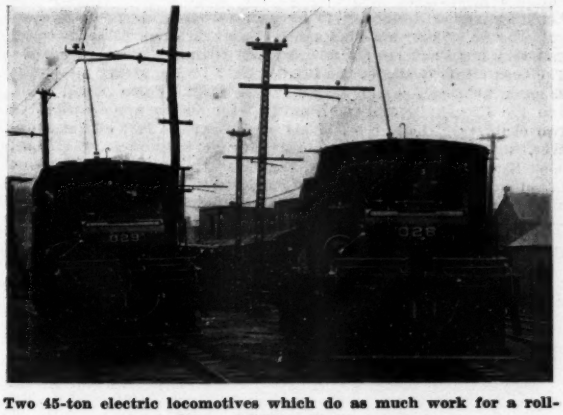
The engines are of the vertical, two-cylinder, four-cycle type, and each is capable of developing its normal output at a speed of 180 revolutions per minute and to carry a 10 per cent. overload for two hours. They mark a distinct departure in the design of this type of internal combustion engine, as they are fitted with marine type cross-heads, running in water-cooled guides that take the thrust which formerly came on the side of the engine cylinders. Two fuel pumps, having a plunger for each cylinder, deliver the fuel directly to each fuel valve. Air for fuel injection and starting purposes is delivered by water-cooled quadruplex high-pressure air pumps which discharge into injection vessels, one for each engine. The

overflow from these vessels is used to keep the two starting reservoirs fully charged. They are interconnected with each other, and with an auxiliary motor-driven air compressor, so that the contingency of any engine not being able to start through loss of air has been amply guarded against. The exhaust leaves the engines through ports in the side of the cylinders, and passes through water-cooled downtake pipes to an underground collector pipe and thence to silencers.

Under each engine cylinder is a ring for collecting the cylinder lubricating oil and for preventing it from mixing with the lubricant in the crank pit. A separate pump is employed to remove the oil from the collecting ring, and the oil consumption can thus be economically adjusted. A speed regulating gear giving a variation of 180 to 198 revolutions per minute is provided to compensate for the different heads against which the pumps have to operate.

TWO ELECTRIC ENGINES REPLACE 160 HORSES

A ROLLING mill company, located about 1½ miles from the nearest railroad track, and at an elevation considerably above it, for a long time did all the hauling of raw materials and finished products to and from the railroad station by the use of horses. The average load had to be drawn by eight-horse teams at a cost of not less than 50 cents on the ton. In order to reduce this expense, the



Two 45-ton electric locomotives which do as much work for a rolling mill as did 20 eight-horse teams

teams were replaced by an electric line 2.3 miles in length, with a minimum grade of about 5 per cent. Two 45-ton electric locomotives (shown in the accompanying illustration) were then put in service. These locomotives now make from eight to ten trips a day, with loads of from 100 to 125 tons each, and are said to be accomplishing the same work that was formerly done by 20 eight-horse teams.

The control equipment of the locomotives is mounted in the center, and the trucks are given a short wheel-base to enable them to negotiate sharp curves easily. Each engine is operated by the same engineer every day, who is held responsible for its condition.

ALUMINUM IN MOTOR CARS

WHILE aluminum is utilized for only a comparatively small part of an automobile, the amount of this metal used in a year by a firm, which manufactures 50,000 automobiles annually, reaches the impressive figure of 5,400,000 pounds, or 2,700 tons. An average of 18,000 pounds of aluminum is used in the foundry every working day. Such parts as the gas intake and water manifolds, crank cases, reduction gear cover, hand wheel spider, clutch spider, beading of the running board and the toeboard, hub caps, besides many others, are made from aluminum, which has the double virtue of combining great strength with very light weight.

Commercial Organizations of International Importance

THE AICHIKEN COMMERCIAL MUSEUM

This Well-Organized Institution at Nagoya, Japan, is a Growing Factor in International Trade

THE Aichiken Commercial Museum, an institution founded and supported by the Prefectural Government of Aichi, Central Japan, has recently been installed in a new set of buildings at Nagoya, the capital city of the district. This museum, which was first opened in 1878 as a small hall for the exhibition of local products, has become a power in the world of commerce, assisting foreign importers and exporters in opening business connections with the local merchants and manufacturers, and engaging special investigators to study outside markets for the direct benefit of native producers.

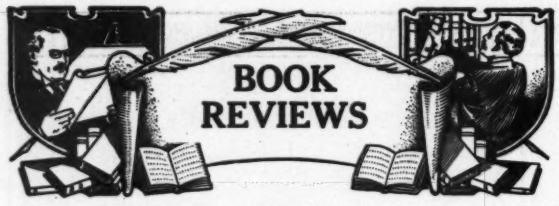
The museum maintains correspondence with business concerns of all countries, collects booklets, periodicals and reports, provides for a scientific library, engages consuls, diplomats, attachés and business men to deliver lectures; makes exhibits of new goods, experiments with new manufacturing processes, and offers the valuable results of tests to the proper establishments; publishes bi-monthly reports in Japanese on interesting business subjects and distributes them gratuitously to prominent merchants, commercial bodies and industrial organizations, and, in addition to the regular exhibits in its buildings, holds "circuit" exhibitions of new collections of goods in various parts of the country.

To facilitate the work of the museum, six departments have been organized; namely, executive, treasury, exhibition, foreign, home and technical. The officials consist of a director, technical experts, technical assistants and secretaries, all of whom carry on the regular work of the museum. The buildings and grounds are open free to the public, nearly all exhibits being arranged systematically in different halls according to their nature—domestic products, foreign goods, reference goods, tools and machinery.

During March and the greater part of April of the current year the museum will hold a special exhibition of samples and catalogues furnished by manufacturers and exporters desirous of introducing their products in Japanese markets. No charge will be made for space. Merchants, manufacturers and other business men of note in the country will be invited to inspect the literature with a view to fostering a steady international trade.

Aichiken, or, as called above, the Prefecture of Aichi, is a district situated in the central portion of Japan, at the head of the eastern coast division of the Empire. It comprises a fertile valley rich in agricultural products and possesses a number of growing industrial enterprises. The yearly output of cotton, silk and mixed fabrics amounts to 30,000,000 yens. The export and import totals, however, have been small, and strenuous efforts are now being made to broaden the markets for its products, which include bamboo furniture, brushes, candles, dried provisions, dyestuffs, fireworks, wearing apparel, leather goods, machine tools and metal ware, musical instruments, soaps and toilet articles, vegetable oils and other goods.

The museum is receiving many inquiries and business propositions from foreign business men, and, as commodities imported for the purpose of exhibition are admitted free of duty, it is expected that this section of Japan will be greatly benefited by its activities.



THE STATES OF CENTRAL AMERICA

REFERENCE has been made more than once in the columns of this REVIEW to the comparative rarity of recent books treating of the Central American republics. There is a great and growing need of accurate information regarding these countries, both on the part of American and European business men seeking for markets overseas, and on the part of capitalists seeking safe and profitable investments abroad. To each of these classes Central America is full of interest at the present time, and, in some of its States, full of opportunity. It is, therefore, a pleasure to be able to report the appearance of two new books regarding this region.

In *"Guatemala and the States of Central America"** Mr. C. W. Domville-Fife has prepared a book along the lines of his well-known work on *"The Great States of South America,"* and has succeeded in producing one of the most valuable books yet published regarding this part of the world. As the title indicates, the treatment is somewhat uneven, no less than 19 chapters, or more than half the book, being devoted to Guatemala, six to Nicaragua, three to Costa Rica, and four to Honduras and Salvador together. The portion on Guatemala is unquestionably the best description of that country that has been written in recent years, if, indeed, it may not fairly be entitled to rank as the best ever written in the English language. The section on Nicaragua is also admirable. The author in his preface alludes to "the difficulties of the task of unravelling the tangled skein of Central American history, politics, finance and commerce," and, considering how very great these are, the clearness and accuracy of his brief summaries on these various topics are most noteworthy. The section on Costa Rica forms a most useful little summary of the leading facts regarding that prosperous republic, and it is mainly because the rest of the book is so very good that one regrets the extreme brevity of the portion relating to Honduras and Salvador. The book is copiously illustrated, chiefly with views in Guatemala and Costa Rica.

The book just described presents the leading facts regarding the history, resources, commerce and industries of the Central American States from the standpoint of an English observer. In *"The Southland of North America"*† we have a breezy and entertaining sketch of travel impressions by an American, Mr. George Palmer Putnam. In a way this book might serve to supplement the other, for the author devotes five chapters to Costa Rica, four to Salvador and seven to Guatemala. Nicaragua and Honduras receive only one chapter between them—the relative space given to each country depending upon the time the author spent there. One of the most valuable and instructive chapters in the book is the one entitled "Banana Land," which describes with great detail and many picturesque bits of narrative the banana region around Port Limón, in Costa Rica. Another exceedingly good chapter is that describing San Salvador, which reveals an understanding of native conditions in this and other Central American countries that is lacking to many travelers. All of the chapters are well worth reading, however, and the book is illustrated with nearly 100 excellent halftones, for the most part showing views not previously published. There is also a brief bibliography.

**Guatemala and the States of Central America,"* by C. W. Domville-Fife. Published by James Pott & Company, New York. Price $3 net.

†*The Southland of North America,* by George Palmer Putnam. Published by G. P. Putnam's Sons, New York. Price $2.50; by mail $2.75.

THE CREDIT SYSTEM *

UNDER this title Prof. Taylor, emeritus professor of political economy in the University of Nebraska, undertakes—to quote from the preface—to "explain what credit is, what it does, and how it works." In the introduction the purpose of the work is further explained (p. 14): "This book is designed as a contribution toward an articulated and consistent explanation of the financial happenings of prosperity, crisis, depression, price-level, interest, capital, and correlated branches, developed from a fundamental conception of credit and money, and from a biological view of social activity."

To the student of economics, and especially to the instructor, the book will no doubt prove of value, inasmuch as it discusses the subject from new standpoints, and frankly disregards or questions old explanations of many of the phenomena connected with the operation of credit as presented in other works on political economy. On the other hand, the average business man will find that this book, like too many others that have been written on the subject of economics, is in the main somewhat too theoretical. There are few subjects more interesting or of more vital importance to the business community than credit. If, instead of theorizing about it, teachers and writers on economics would take the trouble to ascertain how the credit system of the modern industrial and commercial world is actually organized and handled, the factors that really determine credit—not theoretically as deduced from text-books, but in everyday experience—the uses and abuses of credit, and its vast importance in the intricate mechanism of exchange, the result would be a text-book that students would find of real and practical service when they go into business life.

Prof. Taylor divides his work into five parts, as follows: First Principles, Capital, High and Low Prices, The Lessons of History, and Credit and Society. Part IV treats of financial statistics and crises, the causes of crises, and money and credit as mutual substitutes. In many respects this part is the most interesting in the book and will merit perusal by all business men interested in the subject of crises. A bibliography of the subjects discussed is appended to each chapter. The book is excellently printed in clear type, with marginal summaries of the paragraphs and a comprehensive index.

**The Credit System,* by W. G. Langworthy Taylor. 8vo., 417 pages. Published by the Macmillan Company, New York, London, Bombay, Melbourne, Toronto, etc. Price, $2.25 net.

A GUIDE TO THE WEST INDIES

THE new and enlarged edition of Algernon E. Aspinall's *"Pocket Guide to the West Indies,"* published in 1910, has proved so popular that a third edition * has been published, and the fast increasing tourist traffic to the Caribbean as the Panama Canal approaches completion will no doubt cause new editions of this little classic to be called for from time to time. The book is invaluable to every tourist and will be found exceedingly useful to the salesman or business man visiting this region. The author's position as Secretary of the West India Committee of London gives an authority to his work that is absent from most guide books. The maps also merit special mention, being in colors and very large and clear for each small island or group of islands. The book treats chiefly of the British West Indies, giving a separate chapter to nearly every island, while Cuba, Porto Rico, Haiti, and the French, Dutch and Danish West Indies are described in two chapters. The author, in his preface to the last edition, however, states that at some future date he may prepare a guide book for these islands. Special chapters are given to the Panama Canal and to Agriculture and Commerce, and the book contains a fairly good bibliography of the British West Indian Colonies.

**The Pocket Guide to the West Indies,* a new edition, by Algernon E. Aspinall. Published by Duckworth & Co., London.

COMMERCIAL GEOGRAPHY OF THE WORLD *

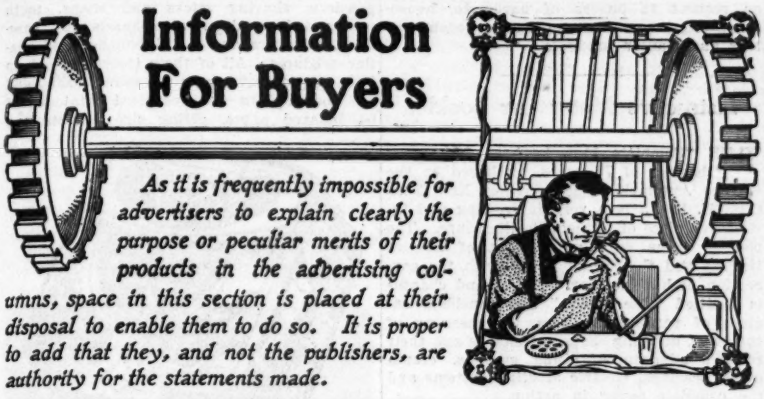
THIS little volume is intended primarily as a text-book for schools and aims to present the more important facts regarding the commercial geography of the countries outside of the United Kingdom. Like most text-books on the subject, it is divided into two parts—general and regional, but the former is very brief. The regional arrangement is somewhat novel. Instead of considering the countries of the world by continents, they are grouped climatically—the temperate lands being described first, and then the tropical countries. This plan has much to recommend it. The book will be found useful for business men desiring to give a brief introductory handbook on commercial geography to their employés, or to schools having elementary classes on this subject.

**Commercial Geography of the World,* Part 2, Outside the British Isles, by Prof. Herbertson and James Cossar, M. A. Published by W. & R. Chambers, Ltd., 38 Soho Sq., London. Price 2s. 6d. Price for Part 1 (The British Isles), 1s.

WORK, WAGES AND PROFITS

THE interest which was inspired by the publication of this book * on the scientific management of manufacturing plants resulted in the rapid exhaustion of the first edition, and in consequence a second edition, with more detailed information and a number of additional instances where the policies and methods of the author have been put into effect, has been issued. In the new edition there have been added chapters on "The Task Idea" and on "Results" as well as articles on "Fixing Habits of Industry," and "A Practical Example of Scientific Management." Among other subjects discussed are the "Economical Utilization of Labor," "The Inefficiency of Ordinary Management Systems," "Common Sense Methods in Improving Plant Efficiency" and "The Four Conditions Necessary to Secure Best Results." A comparison of the results secured by day work, piece work, and task work with a bonus is also an interesting portion of the contents of this book. The new volume will constitute a very useful addition to the reference library of the management of any plant where a large amount of labor is employed.

**Work, Wages and Profits*, by H. L. Gantt. Second Edition, Revised and Enlarged. Published by the *Engineering Magazine Co.*, New York. 312 pages and 27 illustrations. Price $2, net.

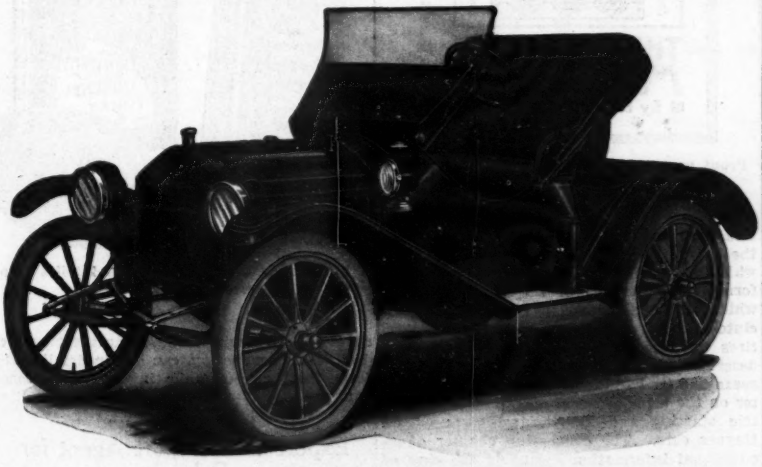


Information For Buyers

As it is frequently impossible for advertisers to explain clearly the purpose or peculiar merits of their products in the advertising columns, space in this section is placed at their disposal to enable them to do so. It is proper to add that they, and not the publishers, are authority for the statements made.

A Reliable Low-Priced Car

THE Metz "22", shown herewith, is a four-cylinder, two-passenger roadster model of 22½ horsepower which is being offered for export by the Metz Company, Waltham, Mass., U. S. A. It is equipped with a very powerful motor for its size, gearless transmission, full elliptic springs, semi-enclosed body of attractive appearance, windshield, extension top and curtains, high grade clincher tires, five lamps and gas generator, bulb horn, pump and standard artillery wheels, and distinctly belongs to a class of low-priced cars, which nevertheless represent unusual value for the money. It is an exceedingly economical car to run, being claimed by the manufacturers to travel from 28 to 32 miles on one gallon of gasoline, 100 miles on one pint of lubricating oil, and from 10,000 to 12,000 miles on a single set of tires, besides attaining any speed from 5 to 50 miles per hour on the high speed and being an excellent hill climber.



The Metz "22," a four-cylinder, two-passenger roadster of 22½ horsepower. Equipped with windshield, extension top and curtains, five lamps, gas generator, bulb horn and tools

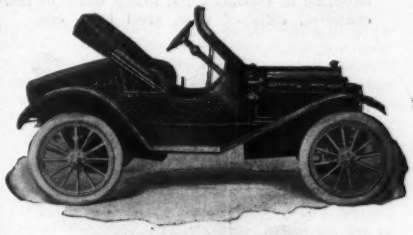
The gearless transmission, or what is also called the friction drive, is claimed to be an improvement over the ordinary complicated gears, the clutch being eliminated and contact made by pressing a metal disc against a fiber wheel. This construction is said to make the car easy to handle, so that one who knows nothing of mechanical operations can drive the machine successfully after a few minutes' instruction. The absence of gears is also claimed to be largely responsible for the ability of the car to climb hills.

The motor is cast in one piece and is water-cooled. The water-jacketed head for the cylinders, however, is easily removable, permitting free access to the combustion chamber, pistons, cylinders and valves, so that carbon can be removed from the combustion chamber or valves ground with ease. The crank shaft is made of high grade heat-resisting steel. The lower half of the crank case constitutes a reservoir for oil. The valves, push rods and springs are completely enclosed, making their action noiseless and excluding road dust and grit. This form of construction also eliminates the throwing of oil by the motor.

A simple oiling system, called the constant level splash oiling system, is used. The oil is poured into the crank case through a breather pipe with a funnel attachment on the side of the motor. The lower half of the crank case, as before mentioned, possesses a bottom section which forms a reservoir for oil, and a pump distributes the oil to pockets directly beneath each connecting rod. More oil than is necessary is at all times supplied to the parts, and an overflow lever permits it to return to the reservoir. By this system all points are amply oiled and there is no waste.

Gasoline is carried in a tank attached to the back of the seat. This position is selected in order to raise the tank high enough to furnish ample flow by gravity to the carburetor. The ignition system is simple, the current passing directly from the magneto to the spark plugs. The top of the car is designed with the idea of utilizing it, when not put up, as a dust shield. The body affords perfect protection to passengers, and the space between the seats and the enclosure is designed so as to permit of entering or alighting with the utmost ease. The changes in speed are made from the driver's seat and are extremely simple, consisting of shifting a lever forward or backward, as may be required. Foot pedals also form a part of the controlling mechanism, two of which operate the brakes, the other the clutch.

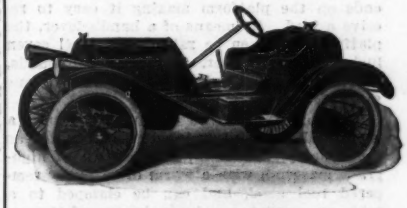
The largest of the accompanying illustrations shows the Metz "22" fitted throughout with standard equipment. One of the smaller views shows the same car equipped in the same manner as that in the larger, the sole difference being that the rear is finished in torpedo design instead of with a platform to accommodate a rumble seat. Both types can be furnished at extra cost with electric starter, head, side, dash and tail lights. The other photograph shows the Metz "Speedster,"



Type of the Metz "22," built complete with a torpedo-shaped rear

a model with all superfluous weight removed. Special equipment includes individual seats, extra large gasoline tank, wire wheels, electric headlights set in the fenders and elaborate nickeled trimmings.

The company is desirous of securing responsible representatives in all territories

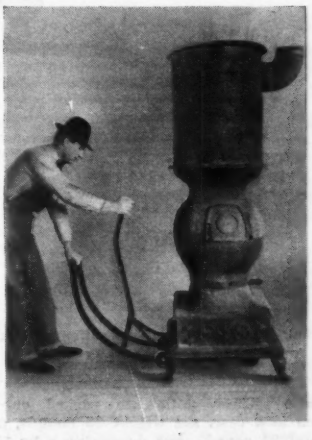


The Metz "Speedster"—superfluous weight eliminated. With wire wheels

where automobiles are used. Anyone interested in a low-priced, but efficient motor car, should write to the company immediately, requesting catalogue Y or any other information, which will be promptly sent to any address.

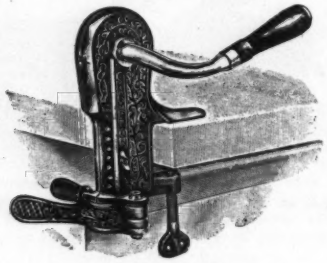
Hardware Specialties for Export

A HANDY stove truck, designed especially for use in factories, hardware and house-furnishing and other stores, in which stoves or similar heavy merchandise must be constantly shifted, is being offered for export to any country by the Arcade Manufacturing Company, of Freeport, Ill., U. S. A. With the aid of this truck one man, the company



Stove truck easily raised and lowered by a lever-handle

claims, can move a stove as easily and quickly as two men can without it. Its use is particularly valuable to salesmen, as the stove can be rapidly moved from a comparatively crowded or poorly-lighted portion of a store to a well-lighted and open space where a customer is offered the satisfaction of being able to examine closely every detail. When not moving stoves, the truck serves for easy handling of refrigerators, heavy boxes of merchandise, coils of wire, steel bars, etc.



A high grade mechanical cork puller. Attachable to tables and counters

The truck is built of light, but strong, steel and possesses a movable platform which can be lowered to within four inches of the floor. The truck is then tilted forward, two sharp ends on the platform making it easy to receive a load. By means of a handle-lever, the platform can then be raised to a level seven inches above the floor. A load of 800 pounds, the manufacturers claim, is a moderate one for this truck.

The company is also offering for export a rapid and powerful cork-puller, designated as the "Champion." The puller is made of high-grade material, with a worm of carefully tempered tool steel, and can be clamped to a table or counter, as shown in one of the accompanying illustrations. When thus attached, its height above the counter level is five inches; the entire weight of the puller is six pounds. Each is packed in a substantial wooden box, together with oil can and extra pair of rubber bushings for the bottle clamp. One style, No. 1 Champion, is nickel-plated. A No. 2 Champion is finished in Arcadian bronze. Both styles are packed one-half dozen in a case, weighing 37 pounds net and 64 pounds gross.

A No. 147 coffee mill, also shown, has a grinding mechanism with an adjustment to admit the production of coarse grains as well as fine powders. The box portion consists of carefully selected stock, highly finished in gold bronze, and measures seven inches

Having an adjustment, this coffee mill grinds coarse or fine equally well

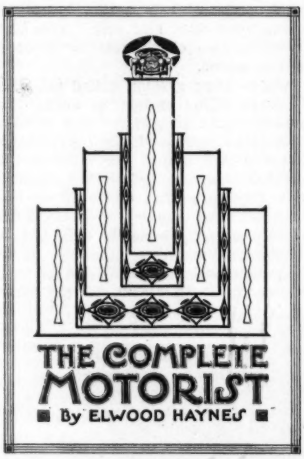
square. These mills are packed one-half dozen in a case, net weight 25 pounds, gross weight 31 pounds, and measuring 8 by 15 by 23 inches.

All of these devices are described in the company's general catalogue containing illustrations and information concerning nearly 700 different items for households and stores. The catalogue, designated as No. 25, contains full export data and will be sent free on request to buyers of hardware, house-furnishings, bar-room supplies, woodenware, toys and similar products.

Instructive Motor Car Booklet

THE "Complete Motorist," an illustrated booklet of 78 pages, published by the Haynes Automobile Company, of New York City, U. S. A., is a very interesting and instructive piece of automobile literature. The booklet opens with an account of Elwood Haynes and the events linked with the conception of his first car. The second chapter is entitled "The Motor," and considers engines of various cylinders, the meaning of the cycle, differing shapes of motors and their relative advantages, oiling systems, crankcases, bearings, electric starting systems and the complete motor in action.

In much the same way, the third chapter, entitled "The Chassis," considers gears and speeds, leading up to the electric selection of speeds through the Vulcan electric gear shift.



Front cover of a new booklet of instruction on the care of motor cars

The transmission of power is traced from the gears to the rear axle, several types of which are outlined. How to care for a car forms the substance of the fourth chapter, which considers the carburetor, motor, valves, clutch, cooling system, lubrication, brakes, tires and steering gear. The fifth chapter describes the electric system for shifting gears and its installation, followed by a chapter on the principles and operation of an electric starting and lighting system used on Haynes cars. The concluding chapter offers additional information regarding the care of accessories and those parts included in the equipment, which is followed by detailed specifications of the Haynes models. All requests for this booklet or for other information should be addressed to The Haynes Automobile Company, 1715 Broadway, Dep't. D, New York City, U. S. A.

Soaps and Toilet Specialties

AN extensive line of high-grade soaps, perfumes and toilet specialties is now being offered to the export trade by the Holman Soap Company, 3104-3118 Fox Street, Chicago, Ill., U. S. A.,

Shown herewith are the company's "Trailing Arbutus" talcum powder and "Butterfly Queene" toilet soap. The soap is a fine milled and highly perfumed variety which is packed in handsome individual cartons, 100 cakes in a box. The other illustration shows one of a fancy line of face powders. This is packed in dozen and gross lots. The company manufactures, in addition, pharmaceutical remedies, sanitary cleansers, washing sodas, scalp tonics and peroxides, skin foods and massage creams, smelling salts, bay rums and sachet powders, shaving sticks and soaps, tooth pastes and powders, witch-hazels and vaselines, furniture and metal polishes and similar products. All of these items are put up in attractive containers for counter sale, and are described in an illustrated catalogue of 64 indexed pages, giving sizes, prices and

One of a fancy line of face powders—packed in dozen and gross lots

numbers for easy ordering. The catalogue, as well as samples and special quantity prices, will, upon application, be sent to any part of the world.

In addition to the sale and manufacture of their own brands, the company maintain a department for the preparation of private brands under the buyer's label. Responsible

A high grade talcum powder and toilet soap attractively put up

agencies, with whom the manufacturers are desirous of connecting, can obtain detailed information by communicating with the company as above.

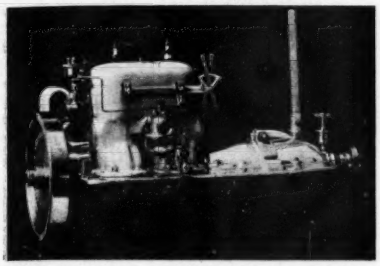
Export and Import Agent for Belgium

MANUFACTURERS, exporters and importers desiring to establish connections for Belgium and Northern Europe are invited to correspond with Philippe Berger, Boite Postale No. 20, Charleroi, Belgium. This concern has been established since 1900 and deals in all kinds of industrial products, including raw materials, such as iron, steel, cast iron, copper, ore, etc., also in modern machinery and new inventions. Among the specialties which it is now representing for export may be mentioned belt conveyors and rollers of cold-rolled steel, machines for refining oils on the centrifugal principle and devices for testing quickly and accurately the hardness of metals.

The firm maintains a special department for the sale of electric motors and electrical accessories, and also invites correspondence relative to the buying or selling of any staple product. Firms desiring representation will be given satisfactory assurances as to the reliable character of this concern, which can furnish references in France, Germany, England, Switzerland, United States and other countries.

New Model Marine Motors

AFTER conducting a careful investigation among its selling agencies in order to determine the requirements of buyers, the Gray Motor Company, 134 G. M. C. Building, Detroit, Mich., U. S. A., manufacturers of marine and stationary motors, is introducing a new model marine engine of the four-cycle type. This engine, designated as model C, develops 20 horsepower at 700 revolutions per minute, and a little over 30 horsepower at 1,000 revolutions per minute. As shown in

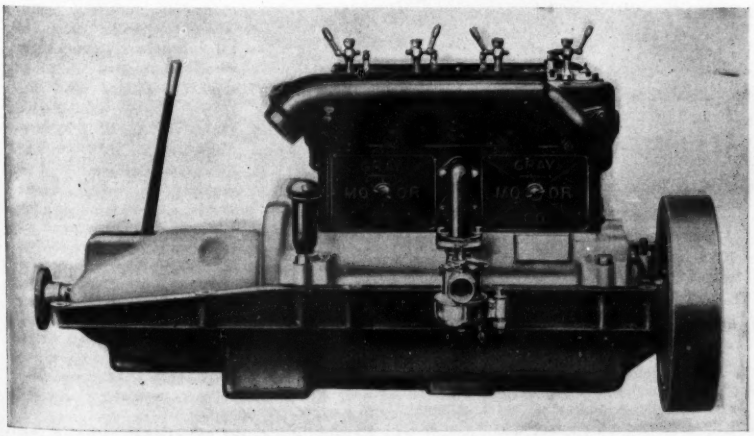


This "Baby Grand" engine serves for yacht tenders and like craft

one of the accompanying illustrations, the cylinders are cast en bloc, which means actually in one piece, and the complete engine weighs 600 pounds. In addition to being made in four cylinders, the engine is also built in a six-cylinder size, which is claimed to develop from 35 to 50 horsepower.

The base of the engine and the clutch cover are made of aluminum. The oil pan is of iron, to add strength and rigidity. To insure maximum safety and economy, the bearings are made unusually large and the wearing surfaces are ample. Another feature of the motor is the fact that any system of self-starting can be installed. An air starter system is specially recommended by the company as being the simplest and most effective for use with the engine. This starter will, by the pressure of a button, do the cranking, and is also claimed to furnish sufficient air for the whistle outfit, for the pneumatic clutch control and for the gasoline pressure feed.

To meet the demand for an extra fine power plant, suitable for mahogany yacht tenders



Provision is made for installing any self-starting system on this new model marine engine of 30 horsepower. The engine complete weighs only 600 pounds

and other craft of elegant type, the company is offering also a new, two-cylinder engine of six horsepower, designated as the "Baby Grand." This model, as shown in the small illustration, is neat, compact and highly polished, with aluminum base. The flywheel is nickel-plated, and the engine surface is finished in gray enamel, resulting in a very attractive combination. The addition of a high tension magneto, by means of which the current for ignition passes directly from the magneto to the spark plugs, contributes toward making the engine a complete unit power plant.

The company maintains a department especially organized to attend to inquiries from foreign countries, and will furnish information concerning marine and stationary engines of any kind. Correspondence is conducted in all languages, and the company's catalogue, printed in English, Spanish, German and French, will be sent free on request to any address.

An Improved Gasoline Lamp

THE National Stamping & Electric Works, manufacturers of independent lighting equipment, announce that they have recently produced, and are now ready to place on the export market, a combination stand and hang-

A combination stand and hanging lamp with automatic cleaning device

ing lamp of somewhat novel design. They state that this new lamp—which they call the "Nulite Favorite No. 10"—represents many years of experiment. One of the chief features of the lamp is an automatic cleaning arrangement which prevents clogging of the tip and facilitates quick lighting. Another point to which the manufacturers direct attention is the fount, which is placed in the base of the lamp and is made of exceptionally heavy material and guaranteed to stand ten times as much pressure as is required to operate the lamp. The shade is furnished in two styles, one of hand-decorated china painted in four colors with amber tints predominating, and the other in plain white. The lamp produces a clear, white incandescent light of 250 to 300 candlepower and, the makers claim, will operate from 55 to 60 hours on one gallon of gasoline.

The makers of this lamp state that it has met with such success among their regular agents that they have begun to manufacture it in larger quantities than any of their other lamps, and as this increased production has greatly reduced the cost of making each individual lamp they are thereby enabled to offer it at an exceedingly low price. They also state that they have some territory open for agents in various parts of the world, and desire to receive inquiries from firms in a position to undertake the agency, as well as from manufacturers' representatives and dealers throughout the foreign field, to whom they are prepared to make a very interesting proposition.

They announce further that they are now printing their new export catalogue and will be ready to mail them out by the time this article is read. Their catalogues are printed in several languages and will be forwarded in the language desired upon receipt of request. These catalogues are free and illustrate more than five hundred different styles of independent lighting appliances, including gasoline and kerosene lamps for every lighting purpose, gasoline stoves and self-heating flatirons, a complete line of electrical appliances, acetylene lanterns and numerous other novelties and specialties. Those interested should address the National Stamping & Electric Works, 406 South Clinton Street, Chicago, Ill., U. S. A.

Low-Priced Cream Separators

FARMERS and dealers in farm and dairy supplies will be interested in an inexpensive but highly efficient device for the separation of cream from milk called the

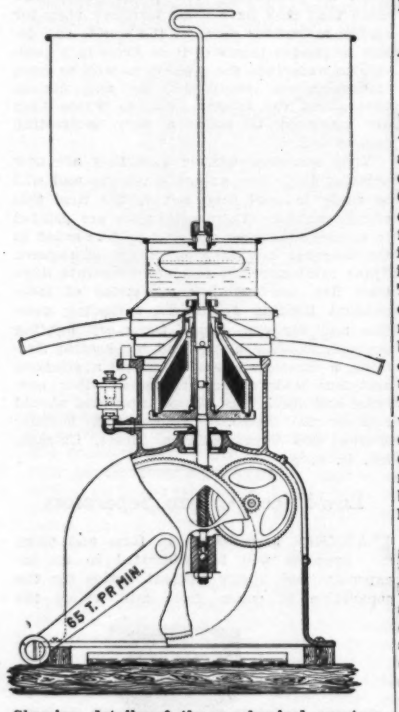
The "Boreal" separator, a very inexpensive machine made in all sizes

Boreal Cream Separator, which has only recently been offered for export. This separator, which is manufactured at Stockholm, Sweden—a country that makes the building of cream separators a specialty—is of extremely simple construction and substantial workmanship. Its manufacturers explain the very low price at which it is offered by the fact that for more than forty years an army of skilled workmen has been employed in its designing and building, and the experience gained during this long period enables them to reduce materially the cost of production while at the same time obtaining unusual accuracy in the different parts.

The separator is made in these sizes, viz., A, B, 0, 1, 2, 3, 4, 5, and 6, with respective skimming capacities of 9, 11, 13½, 22, 33, 55, 90, 104 and 132 gallons per hour. These sizes are divided into four different series: Numbers 0, 1, 2 and 3 for farms with from one to 12 cows; 4, 5 and 6 for larger farms and small dairies; 7 and 8 for dairies of average size, with motor attachments; and A and B for households and very small farms. For very large farms and dairies, models with skimming capacities of 310 and 460 gallons are also offered.

The bowl of the Boreal separator contains plates, which can be easily taken out for cleaning. This combination of bowl and plates is described as being almost indis-

pensable for clean and sharp skimming. In order to afford the greatest thoroughness and ease in cleaning, the bowl is so constructed that it can be taken to pieces. The milk-basin is pressed in one piece, and in models A and B the milk admission is regulated by means of a floating cup.



Showing details of the mechanical construction of the "Boreal" separator

All of the models are attractively finished and claimed to be absolutely hygienic in operation and very economical. Firms in any part of the world who are desirous of securing the agency for the separators can obtain full details regarding prices, sizes and shipping terms by communicating with Ossian Baeckman, 96 Boulevard de la Senne, Brussels, Belgium.

Canned Sardines and Other Fish

FISHERY products have always been the most important export commodity of northern and western Norway, and one of the largest canning centers in the world is the city of Stavanger, a seaport on the western coast of that country. The canning industry was started in this town about 40 years ago, when a number of packers began to smoke and preserve a small and very delicate sardine found in the nearby fjords. Their product proved to be of excellent quality and there are at present 80 canning establishments in Stavanger engaged principally in packing sardines and shipping their product to all parts of the world.

Some of the largest packers, including The Viking Sardine Factory, have recently installed apparatus for curing unsmoked sardines and herrings, and are also engaged in the preparation of cured herring in tomatoes, broths, bloaters, salmon, eels, mackerel, trout, anchovies, cod roe, crabs, cray fish, kippered herring and cured herring in other dressings. The processes and general methods used are the cleanest possible, machinery operated by electric power being employed in most instances to avoid handling and to insure the maximum purity and wholesomeness in the products.

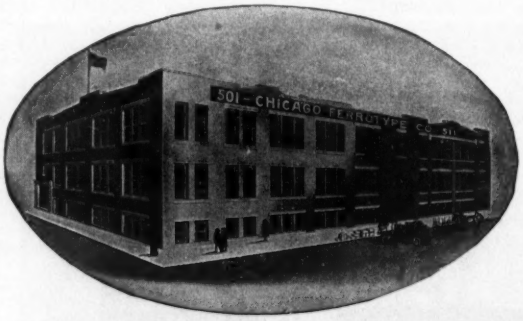
Operated in connection with the canning factories are label printing offices, special establishments for making wood cases and waste for packing, besides machine shops for manufacturing cans and other containers. The Viking Sardine Factory is in direct communication with the principal centers of the world so that its products can be shipped at all times. The company is thoroughly experienced in exporting, and all correspondence received will be given prompt attention. Address The Viking Sardine Factory, Stavanger, Norway.

Agents Wanted for Selling Minute Photo and Post Card Machines

PROGRESSIVE business men in all parts of the world who are on the lookout for attractive agency propositions will be interested in the full-page announcement of the Chicago Ferrotype Company, which appears elsewhere in this issue. The company has for the past ten years been actively engaged in the manufacture and sale of a large variety of "one-minute" picture-taking machines. The first machine put on the market was called the "Wonder Automatic" photo button machine. The name "Wonder" was selected because the machine was capable of turning out completely finished button photographs at the remarkably rapid rate of 250 per hour. The success of this machine lead to the invention of the "Wonder Cannon"—the word cannon being used because it appropriately described the shape of the device. This new machine was capable of turning out original button photographs at the rate of 360 per hour.

The success with which these two photographic button machines were received throughout the world showed the inventors, Messrs. L. and M. Mandel, that there was a great market for rapid picture-taking machines. They therefore endeavored to perfect a process whereby photographs could be made directly on postal cards without using plates and films, without printing the pictures, and without the use of a dark chamber. They were finally successful in perfecting such a process, and the Mandel post card machine, when placed on the market, met with even greater success than the photo button machines that had preceded it.

This machine differs from the ordinary camera because it eliminates from photography the need of experience. It does away with all expensive camera accessories, and reduces rapid photography to a very simple basis. The makers state that it enables anyone, no matter how little he may know about taking pictures, to make an immediate success. The Mandel post card machine provides for every operation necessary to take, finish and deliver post card photographs in a minute's time. The photos are taken and finished entirely within the camera. The perfection of this remarkable process has opened up new money-making opportunities for operators in all parts of the world, because the demand for low-priced pictures taken in a moment is practically universal. Hundreds of men and women who have no particular kind of work that they are following at present, and who desire to engage in business for themselves, will find this line to be one that merits investigation. The manufacturers of the Mandel post card machines state that such persons can make an immediate and permanent success as one-minute post card photographers, because in this machine they have a completely equipped portable photo studio which they can carry about from place to place.



Plant of the Chicago Ferrotype Co., manufacturers of machines for taking pictures on buttons and postal cards

The Chicago Ferrotype Company has just inaugurated an extensive advertising campaign in which they state that $75,000 will be expended for advertising their post card machines throughout the world. In order to facilitate the handling of the orders which this advertising will bring, they desire to make connections with live, progressive agents who will devote their entire time to the selling of their complete line of one-minute picture-taking cameras and supplies. To these agents they will grant exclusive territory, and all orders which are received from countries where exclusive agents have been appointed will be referred to them, in order that they may fill the orders direct. The company will also send to their exclusive agents the names of all persons who have written to them direct and expressed a desire to purchase a one-minute picture-taking outfit. In these and other ways the company will cooperate with their local agents to the fullest possible extent, so that the business may be profitable for their agents as well as for themselves.

Post-card photographs can be taken and finished entirely within this camera

The company further state that they are desirous of connecting with high-grade men only—men who appreciate the value of advertising and who will vigorously follow up this advertising by personal calls and by strong personal letters that will bring business. The company will require agents to carry a complete line of their picture-taking machines in sufficient quantities to enable them to fill orders immediately when customers call or send for goods. For this reason, those who desire exclusive agency connections with the Chicago Ferrotype Company will be required to invest about $2,000 (American gold) for a complete assortment of one-minute picture-taking machines and supplies. The company state, however, that they will willingly extend credit up to the value of $1,000 (American gold) where necessary, upon receipt of satisfactory letters of recommendation concerning those desiring exclusive agencies.

In addition to the statements made in the full-page announcement above mentioned, the company undertake to show anyone interested how exclusive agents can, on an investment of about $2,000, earn a clear profit of $2,000 to $5,000 (American gold) per year. As territory will naturally be assigned very rapidly, those interested should lose no time in writing for full particulars. Address all communications to the Manager of the Export Department, Chicago Ferrotype Company, Ferrotype Building, Chicago, Ill., U. S. A.

A New Leather for Export

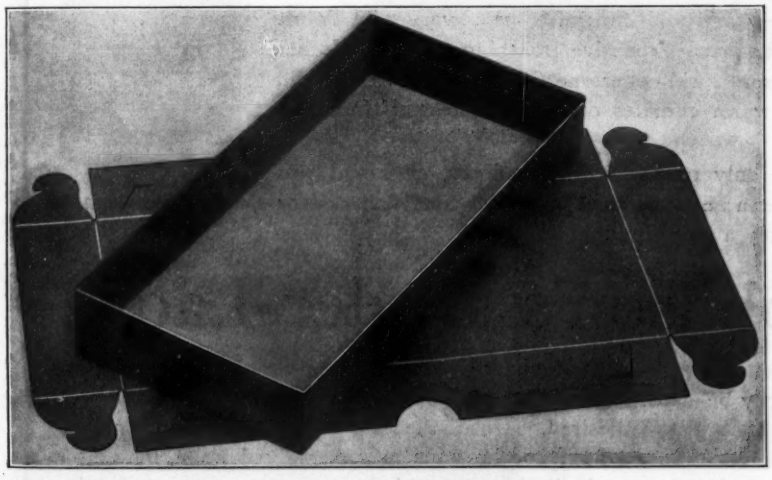
THE Du Pont Fabrikoid Company, of Wilmington, Del., U. S. A., manufacturers of Fabrikoid leather, a moisture-proof, non-cracking material, which is claimed by its makers to be better and less expensive than most leather for upholstering purposes, has recently received an order from Italy for Fabrikoid to be used for lining automobile interiors, including the private car of Queen Margaret.

The use of Fabrikoid in place of leather for upholstering automobiles is becoming popular in the United States, the company report, and the idea is expected to spread to other parts of the world.

The concern are now supplying five car loads a month of Fabrikoid to one user, and prospects are considered good for future sales. The adoption of Fabrikoid in place of leather, it is pointed out, is due chiefly to the fact that the leathers generally used are higher in price and of uneven strength and texture.

Paper Folding Boxes.

IN the sale of many commodities the manner in which the articles are put up is often second in importance only to the quality of the goods itself. Attractive cartons, boxes or other forms of containers are not a luxury in retail business, but a necessity, for they aid materially in selling. The folding paper box belongs to this class. While vastly superior to wrapping paper it is said to be only a trifle more expensive, and suitable for use in an unusually large number of trades.



As the illustration shows, this box can be shipped flat, thus occupying a minimum space and reducing freight bills

The D. Lindley Box & Paper Company, who make folding boxes a specialty, manufacture their boxes from high-grade box board secured direct from nearby mills. The boxes are shipped flat and weigh about 40 pounds per cubic foot. A minimum amount of space is required as it is possible, for example, to pack a thousand full telescope suit boxes in one stack about 2½ feet long, 1½ feet wide and 6 feet high.

This fact makes the line one that is particularly adapted for export, and the manufacturers state that they are already shipping carload lots to the Philippine Islands more cheaply than they could send them to Denver, Colorado, and any other stern points in the United States. As the goods pack perfectly flat and nest together with absolutely no waste space whatever, marine transportation charges are reduced to a minimum, while all danger of breakage is practically eliminated.

Each box is provided with corner locks which are so designed that the whole is easily and securely assembled. While these goods can be supplied to suit special requirements, some of the trades using them to special advantage are: bakers, milliners, florists, clothiers and laundries. Retailers, the manufacturers point out, can place their names or other suitable printed matter on the boxes, which, if taken home and utilized by customers, become permanent pieces of advertising.

Samples of the materials used in the construction of its boxes and a box of actual size will be sent postpaid, together with prices and other information desired, to any address. The company retains a paper folding box expert to aid buyers in securing sizes and shapes to suit their particular needs, and carries so large a stock of standard sizes that any order can be filled without delay. All communications should be directed to the D. Lindley Box & Paper Company, Gas City, Ind., U. S. A.

Disinfectants and Sanitary Supplies

BUYERS of insecticides, disinfectants and sanitary supplies will be interested in a number of pamphlets and leaflets which are being distributed by the Worrell Mfg. Co., Saint Louis, Mo., U. S. A. One of the pamphlets, entitled "The Age of Sanitation," deals with insects and germs as a means of infection and with the best methods for their extermination. The merits of the company's "Vermin-go" Liquid exterminator are described and shipping prices and other particulars given. Sprayers of various capacities for household and other uses are illustrated, with prices.

Among the other preperations featured in the pamphlets are "Eucolium," a liquid deodorant and disinfectant for special use in closets and urinals; "Vermin-go" liquid sanitary soap; "Solvo," a non-inflamable solvent and cleanser for fabrics and leathers; hygienic tissue paper towels; roach powders; floor oils; rat pastes; pine bactericides; formaldehyde; spray compounds, etc. Directions are also given for the application of the preparations and numerous testimonials from users are included.

The manufacturers state that they are very desirous of corresponding with foreign houses in a position to handle the above-mentioned products, particularly "Vermin-go." They add that they do not place goods on consignment or commission, but sell outright at very favorable terms that give the purchaser a liberal profit.

Housekeepers, custodians of prisons, poorhouses, schools, theaters and other public buildings or large institutions where germs are apt to be carried and multiplied on a large scale, physicians, veterinarians and other buyers interested in this class of goods should write for the pamphlets, which are printed in both English and Spanish.

Have you a clean, attractive Water Supply?

YOU can transform the dirtiest water into bright, clear, sparkling water; you can remove odor or taste, making the water pleasant and safe to drink if you will use a

LOOMIS-MANNING FILTER

The reason why these filters have come to be recognized as the leading filters for use in office buildings, hotels, hospitals, country homes, city homes and all kinds of manufacturing establishments may be stated briefly as follows:

Simple to Operate

The filter is cleansed by reversing the flow of water, which is accomplished by the movement of one lever operating the Manning Single Controlling Valve. This valve makes the care of the filter very simple and makes mistakes impossible.

Effective Results

The filter produces splendid results over long periods of time because the filter bed is kept in good condition by our system of cleansing it. The Loomis Cutting plate through which the bed passes under the action of the washing current breaks up the bed so that every particle is cleansed. The entire bed agitates every time it is washed. All accumulations are driven off through the waste line and the sight glass into any convenient sewer or drain.

Durable Construction

Only materials which will withstand the corrosive action of water to the highest degree are used in the construction of this filter. The outside casing is cast iron, the Manning Single Controlling Valve is solid bronze, the screens are tinned copper, pipe work is either galvanized iron or brass as desired.

They Filter All the Water

The entire water supply entering a building or residence, the water used in manufacturing, for bottling purposes or for boiler use can be made bright, clear and attractive. The filter is attached to the main supply pipe so that every drop of water passes through it. Full instructions for connecting up and for operating are sent with each filter.

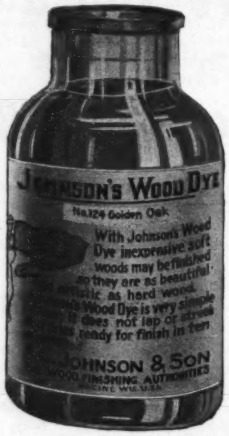
The filters are built in many different sizes, styles and capacities. Inquirers should state the quantity of water desired to be filtered per minute or per hour, the condition of the water to be filtered, the pressure available, and the size of their supply pipe.

Loomis-Manning Filter Mfg. Co.

131 South 16th Street

Philadelphia, Pennsylvania, U. S. A.

Cable Address: LOOMISMAN, W. U. T. Code



Johnson's Wood Dye

for the artistic coloring of all wood. With it inexpensive soft woods may be finished so they are quite as beautiful as hard wood. Johnson's Wood Dye is a combination of spirit-oil dye possessing the good qualities of both a spirit and an oil stain and the disadvantages of neither.

Johnson's Wood Dye is manufactured in seventeen shades, all of which may be lightened by adding wood or denatured alcohol and darkened by adding No. 172 Flemish Oak Dye. Two or three shades may also be mixed together—in this way hundreds of different effects can easily be produced.

One of the greatest advantages of Johnson's Wood Dye is the fact that any preparation, except shellac, can be used over it, with perfectly satisfactory results.

Johnson's Prepared Wax

for finishing and polishing all new and old furniture, woodwork and floors. Contains 20 per cent. more of the hard expensive polishing wax than other brands on the market—for this reason it will cover one-fifth more space and will never become sticky or tacky in warm climates or from the heat of the body. Unsurpassed as a furniture polish.

Johnson's Prepared Wax is the only proper finish for floors, as it will not show scratches or heel-marks and can be easily kept in perfect condition. Very easy to use—simply apply with a cloth and polish with a dry cloth.

Johnson's Under-Lac

superior to shellac or varnish and should be used wherever these preparations would ordinarily be used. Particularly adapted for use over Johnson's Wood Dye where a high gloss is desired. Unequalled for oilcloth, linoleum, etc. It dries hard in less than an hour so the floor may be walked upon, making it particularly desirable for use in bath rooms, kitchen, dining rooms, and other rooms which are in almost constant use.

Johnson's Powdered Wax

for ball-room floors. Put up in enameled tin cans with perforated tops. Very easy to use—simply sprinkle lightly over the floor just before the dance and the feet of the dancers will spread the wax, polishing the floor and producing a perfect dancing surface. It is absolutely free from dust. Has just slip enough and not a bit too much.

It requires no skill to apply Johnson's products—they are prepared especially for use by inexperienced men and women. They should have a place in every home, school, office, store—in fact, every building where there *is* woodwork and furniture.

BIG PROFITS FOR DEALERS! **Dealers and Merchants will find this line profitable to handle. We furnish all dealers with large quantities of attractive advertising matter, good sized samples for free distribution, finished wood panels, window displays, signs and hangers. We are anxious to make connections with responsible firms who are prepared to make a good sized investment and push the sale of this line which is known the world over as one of high merit. Write us for prices.**

S. C. JOHNSON & SON

"The Wood-Finishing Authorities" RACINE, WIS., U. S. A.

A New Press Room Convenience

A CATALOGUE calling attention to and describing a new device known as the "Rouse Paper Lift" has just been issued by the manufacturers, H. B. Rouse & Co., 2214-16 Ward Street, Chicago, Ill., U. S. A. This machine is designed to save the time lost in lifting paper to the feedboards of cylinder presses. It is located at the rear of the press and a full day's run of paper can be placed upon it. The paper is automatically lifted to the level of the feedboard so that all the feeder needs do is to slide off from the pile from time to time as much stock as he can conveniently handle. This does away with the necessity of periodically stopping to allow the feeder to put up another "lift," which, before the introduction of the "Rouse Paper Lift," had to be taken from a pile more or less distant from the press.

The immediate adoption of the new machine by many large printing houses indicates that its merits were at once perceived, and that the claims of the makers that its use will insure from 1,000 to 1,500 more impressions per day from each press than could be turned out when lifting the paper by hand rest upon a substantial foundation.

Copies of this catalogue, together with prices and all other particulars will be sent to any address upon request.

Picture Frames and Mouldings

BUYERS looking for an attractive novelty will find much of interest in the line of pictures and picture frames manufactured by the Frank W. Williams Company, W. Taylor Street and Campbell Avenue, Chicago, Ill., U. S. A. This concern, which was started about a half century ago on a very small scale, now operates an extensive plant devoted to the production of frames, mouldings, mirrors, artistic portraits and pictures of all descriptions.

The frames are made in Roman Gold Antique, Imitation Circassian Walnut, gold burnished and various other wood finishes.

Frank W. Williams, President of Frank W. Williams Co.

Some of the styles are designed for square glass, some for flat and others for either square or convex, this company claiming to have originated wood frames for convexed portraits. Pearl paintings, which the concern offers in large number, are pictures handpainted on glass in lasting colors and attractively inlaid with genuine mother of pearl. These paintings measure 16 by 20 inches, and include landscapes, prominent structures and subjects of historic interest. Manufactured in the same size are the Williams Royal Carbons, reproductions of famous paintings on specially prepared heavy paper. By means of an up-to-date photo-color process, the company also makes an attractive line of pictures in colors on an extra heavy coated photo plate paper. Where the desired frames are ordered, there is no extra charge for fitting these sheet pictures, as well as the carbons, into them.

All of these frames and pictures, together with illustrations of an extensive range of designs in hardwood and finished imitation mouldings and mirrors, are described in a concisely written catalogue of 36 pages, designated as No. 28. Prices, sizes and dealers' terms are given and export orders are invited. The company carries on correspondence in all foreign languages, and its arrangements with railroad, steamship and forwarding companies insure to buyers the lowest rates of transportation, as well as prompt delivery. All orders are carefully packed, and liberal discounts are offered for cash. In addition to the general catalogue, a special booklet devoted to illustrations of the company's line of finished portraits will be sent free on application. Address all communications to the company as above.

Portable Acetylene Lights

IN an illustrated catalogue of 48 pages the Alexander H. Milburn Company, Baltimore, Md., U. S. A., describes its comprehensive line of portable acetylene lights. This company, which devotes its entire attention to the manufacture of acetylene lamps and

FISHEL, ADLER & SCHWARTZ COMPANY
Offices, 340 E. 59th St.—Show Rooms, 878 Broadway, N. Y., U. S. A.
Printing works in Vienna, Paris, London and New York

41x75 Centimeters **UN REVE D'AMOUR** 16¼x29½ Inches
For 42 years the principal Publishers at wholesale of high quality
Photo-engravings, Etchings, Facsimiles, Mezzotints, etc.
The most extensive line in the world. Special prices for export.
Our new catalogue sent only to dealers upon request.

THE MOST FAMOUS AND EXCELLENT
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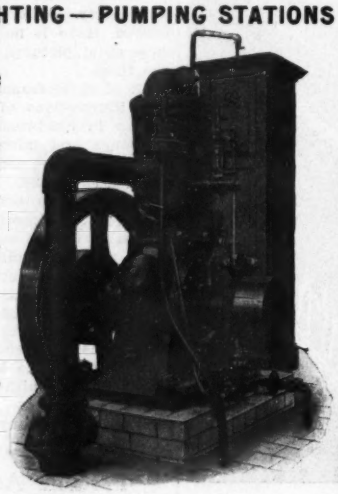

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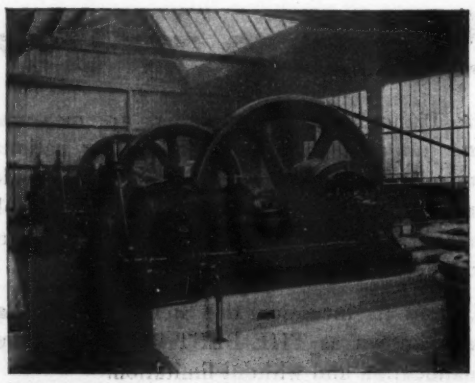

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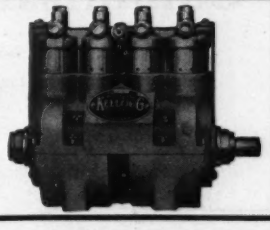

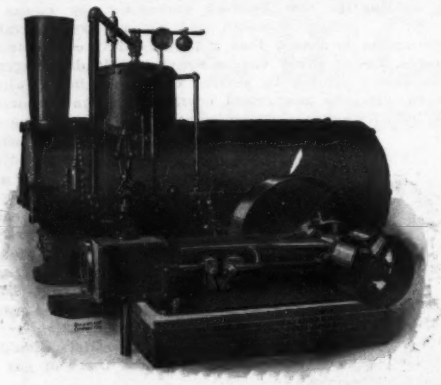

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